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THE PHILIPPINE

JOURNAL OF SCIENCE

C. BOTANY

VOL. X JANUARY, 1915 No. 1

NEW OR NOTEWORTHY PHILIPPINE PLANTS, XI

By E. D. MERRILL [1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The eleventh paper of this series is essentially like its predecessors.[2] It consists of the descriptions of 90 new species of Philippine plants in the families *Chloranthaceae, Aristolochiaceae, Saxifragaceae, Cunoniaceae, Leguminosae, Simarubaceae, Burseraceae, Anacardiaceae, Sabiaceae, Rhamnaceae, Elaeocarpaceae, Begoniaceae, Ericaceae, Sapotaceae, Apocynaceae, Verbenaceae,* and *Gesneriaceae.* About 12 previously described species are for the first time credited to the Archipelago, making the total number of additions to the Philippine flora, recorded in this paper, approximately 100. Genera recorded from the Archipelago for the first time are *Aquilaria, Koompassia, Melilotus, Neptunia, Cymodocea, Diplanthera, Hanguana, Urceola, Vallaris,* and *Protium.* A few reductions are made and a few changes in nomenclature are recorded as such changes have been indicated by the rules of the international code of botanical nomenclature.

[1] Associate professor of botany, University of the Philippines.

[2] New or Noteworthy Philippine Plants. Govt. Lab. (Philip.) Publ. 6 (1904) 5–18; II, l. c. 17 (1904) 5–47; III, l. c. 29 (1905) 5–50; IV, l. c. 35 (1905) 5–68; V, Philip. Journ. Sci. 1 (1906) Suppl. 169–246; VI, l. c. 3 (1908) Bot. 219–267; VII, l. c. 4 (1909) 247–330; VIII, l. c. 5 (1910) 167–257; IX, l. c. 7 (1912) 259–357; X, l. c. 9 (1914) 261–337.

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HYDROCHARITACEAE

THALASSIA Solander

THALASSIA HEMPRICHII (Ehrenb.) Aschers. in Engl. & Prantl Nat. Pflanzenfam. 2[1] (1889) 254.

Schizotheca hemprichii Ehrenb. in Abh. Akad. Berlin 1 (1832) 429.

CAVILLI ISLAND, Sulu Sea, *Merrill 7180*, September, 1910, on coral sand, submerged at low tide; sterile specimens, det. C. H. Ostenfeld. LUZON, Manila Bay, *Merrill*, August, 1911, washed up on Pasay beach.

Not previously recorded from the Philippines; widely distributed along the tropical shores of the Indian and Pacific Oceans.

HALOPHILA Thouars

HALOPHILA OVALIS (R. Br.) Hook. f. Fl. Tasm. 2 (1860) 45.

Caulinia ovalis R. Br. Prodr. (1810) 339.

BANCORAN ISLAND, Sulu Sea, *Merrill 7155*, September, 1910, sterile specimens growing on coral sand in shallow water, 0.4 to 1.3 m deep at low tide, det. C. H. Ostenfeld.

This species has previously been recorded from the Philippines by Naves,[3] but the record has not before been verified. It is to be noted that *Halophila ovalis* Hook. f. is quite distinct from *H. ovata* Gaudich. For a consideration of the latter see Ostenfeld's paper.[4]

Widely distributed along tropical shores of the Indian and Pacific Oceans.

HALOPHILA SPINULOSA (R. Br.) Aschers. in Neumayer Anleit. Wissensch. Beob. 368, ed. 3 (1905) 396; Benth. Fl. Austral. 7 (1878) 183.

Caulinia spinulosa R. Br. Prodr. (1810) 339.

LUZON, Province of Camarines, *For. Bur. 13375 Curran*, June, 1908, sterile specimens thrown up by the waves, det. C. H. Ostenfeld.

This species has previously been reported from Mindanao by Ascherson, l. c. ed. 3, as indicated to my by Dr. Ostenfeld.

Eastern and northern coasts of Australia, the Philippines, and Java.

POTAMOGETONACEAE

CYMODOCEA Koenig

CYMODOCEA ROTUNDATA (Ehrb. & Hempr.) Asch. & Schweinf. in Sitzber. Ges. Freunde Berlin (1870) 84; Graebner in Engl. Pflanzenreich 31 (1907) 147.

Phucagrostis rotundata Ehrb. & Hempr. Symb. Phys. Bot. *t. 11.*

CAVILLI ISLAND, Sulu Sea, *Merrill 7180A*, September, 1910, sterile specimens mixed with *Thalassia hemprichii* Aschers., det. C. H. Ostenfeld.

This species has already been reported from Mindanao by Graebner, l. c. It extends from the shores of the Red Sea southward to Madagascar and eastward to Mindanao, Timor, and Australia.

[3] Novis. App. (1880) 298.
[4] Philip. Journ. Sci. 4 (1910) Bot. 68.

DIPLANTHERA Thouars

DIPLANTHERA UNINERVIS (Forst.) Aschers. in Engl. & Prantl Nat. Pflanzenfam. 2[1] (1897) 37; Graebner in Engl. Pflenzenreich 31 (1907) 152.

Zostera uninervis Forsk. Fl. Aeg.-Arab. (1775) 159.

CAVILLI ISLAND, Sulu Sea, *Merrill 7179*, September, 1910, on coral sand in shallow water, usually exposed at low tide; sterile specimens det. C. H. Ostenfeld. LUZON, Manila Bay, on the Bataan coast, *Shaw*.

Not previously reported from the Philippines; tropical shores from the Red Sea and the east coast of Africa to Malaya, Australia, and Polynesia.

FLAGELLARIACEAE

HANGUANA Blume (*Susum* Blume)

HANGUANA MALAYANA (Jack) comb. nov.

Veratrum ? malayanum Jack in Malay Miscel. 1 (1820) 25; Hook. Bot. Miscel. 2 (1831) 74.

Hanguana kassintu Blume Enum. Pl. Jav. (1827) 15, ed. 2 (1830) 15; Miq. Fl. Ind. Bat. 3 (1857) 248.

Susum malayanum Planch ex Hook. f. Fl. Brit. Ind. 6 (1892) 391; Ridl. Mater. Fl. Malay. Penin. 2 (1907) 132.

Veratonia malayana Miq. Fl. Ind. Bat. 3 (1857) 553.

PALAWAN, Malampaya Bay, *Merrill 7221*, September, 1910. MINDANAO, Province of Surigao, Hinatuan, *Piper 529*, May, 1911.

There seems to be very little doubt as to the identity of *Veratrum malayanum* Jack and *Hanguana kassintu* Blume, and as Blume's generic name *Hanguana* has three years priority over his generic name *Susum*, it is here adopted. The case is not covered by the lists of *nomina conservanda* adopted by the Vienna or the Brussels botanical congress.

The genus has previously not been reported from the Philippines. Malay Peninsula and Archipelago.

CHLORANTHACEAE

CHLORANTHUS Linnaeus

CHLORANTHUS VERTICILLATUS sp. nov.

Herba erecta, ramulis subtus foliisque ad nervos plus minusve furfuraceo-pubescentibus; foliis membranaceis, breviter petiolatis, verticillatis, ovatis ad elliptico-ovatis vel elliptico-obovatis, acuminatis, usque ad 10 cm longis, utrinque angustatis, margine distincte acute apiculato-serrulatis; spicis 1 vel 2, 2 ad 3 cm longis, pedunculo elongato; squamis antheriferis 3-partitis, lobis inaequalibus, intermedia 4 mm longa.

An erect, apparently branched herb, the younger branchlets, the lower surfaces of the leaves on the veins and reticulations, and to a lesser degree the inflorescence more or less furfuraceous-pubescent. Leaves verticillate at the apices of the branchlets, in whorls of 4, membranaceous, ovate to elliptic-ovate or elliptic-

obovate, about equally narrowed to the slenderly acuminate apex and to the acute base, 8 to 10 cm long, 3.5 to 5 cm wide, the margins prominently and acutely apiculate-serrate except in the lower 1 cm and the margins of the acumen which are entire; nerves 7 or 8 on each side of the midrib, distinct, anastomosing, the reticulations lax; petioles furfuraceous-pubescent, about 2 mm long. Inflorescence terminal, slightly pubescent, solitary, including the peduncle up to 13 cm in length, each bearing one or two, rather many flowered, 2 to 3 cm long spikes. Flowers white, the bract orbicular-ovate, irregularly toothed, 1.7 to 2 mm long, rounded. Pistillate flower: Ovary narrowly ovoid, somewhat narrowed at both ends, about 2 mm long, glabrous. Staminate flowers: Antheriferous scale 3-partite, the lobes oblong, rounded, the central one about 4 mm long, 1.2 mm wide, bearing an oblong, 1.2 mm long, 2-celled anther, the lateral lobes about as wide, one-half as long, each bearing a 1-celled anther.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19757 McGregor*, February, 1913.

Probably as closely allied to *Chloranthus henryi* Hemsl. as to any other species. It is distinguished, however, by its pubescent branchlets and lower surfaces of its smaller leaves, its inflorescence reduced to 1 or 2 spikes, and its smaller flowers. From its closest Philippine ally, *C. philippinensis* Merr., it differs in its much smaller, pubescent, shortly petioled leaves, and its larger flowers.

ARISTOLOCHIACEAE

ARISTOLOCHIA Linnaeus

ARISTOLOCHIA LEYTENSIS sp. nov.

Species *A. tagala* et *A. mindanaensis* similis et affinis, differt floribus multo majoribus, usque ad 8.5 cm longis.

A slender vine, nearly glabrous, the branches brownish when dry, glabrous, deeply sulcate. Leaves ovate, membranaceous, glabrous, of about the same color on both surfaces, somewhat shining, 14 to 17 cm long, 8 to 10 cm wide, entire, the apex acuminate, the base deeply and prominently cordate, the sinus about 2 cm deep, 1.5 to 2 cm wide, often obovate, the basal lobes rounded; basal nerves 3, the lateral pair soon forked, and its lower branches soon forked again, the lateral nerves above the base about 3 on each side of the midrib, prominent, the reticulations very lax; petioles 4 to 7 cm long, glabrous. Racemes axillary, solitary, the rachis slender, slightly pubescent, about 3 cm long, each raceme bearing about 6 flowers, not all developing at one time, each flower subtended by an ovate-lanceolate, acuminate, slightly pubescent bract, the pedicels minutely

pubescent, 7 to 10 mm long. Ovary somewhat clavate, about 8 mm long, the tube constricted for 4 mm above the ovary, then inflated, the larger portion of the tube about 3 cm long, swollen at the base, then constricted, and again enlarged and somewhat funnel-shaped, the lip narrowly lanceolate, glabrous, gradually narrowed upward to the slenderly acuminate apex, 5 to 6 cm long, about 5 mm wide.

LEYTE, near Dagami, *Bur. Sci. 15201 Ramos*, August, 1912, in thickets along streams.

A species with much the same vegetative characters as *Aristolochia tagala* Cham., and *A. mindanaensis* Warb., the leaves being very similar in all three species. *Aristolochia leytensis* is, however, entirely distinct from both the above in its much larger flowers.

SAXIFRAGACEAE

CURRANIODENDRON Merrill

CURRANIODENDRON APOENSE (Elm.) comb. nov.

Dedea apoensis Elm. Leafl. Philip. Bot. 3 (1910) 682 (August 8).
Curraniodendron dedeaeoides Merr. in Philip. Journ. Sci. 5 (1910) Bot. 177 (August 19).

This characteristic species was approximately simultaneously described by Mr. Elmer and by myself, but Mr. Elmer's publication of the species under *Dedea* antedates my own publication of the new genus and species *Curraniodendron dedeaeoides* by about ten days. I have reëxamined the material and am still of the opinion that the plant is worthy of being considered the type of a distinct genus, although as previously indicated, very similar to, and manifestly closely allied to the New Caledonian genus *Dedea* Baill. The question for the future monographer to decide is whether or not the resinous, not lepidote vegetative parts, the difference in number in floral parts, and the very decided difference in the number of ovules constitute sufficiently valid generic differences.

The species is represented by the following material: NEGROS, Mount Marapara, *For. Bur. 13634 Curran & Foxworthy.* LEYTE, Dagami, *Bur. Sci. 15283 Ramos.* MINDANAO, Mount Apo, *Elmer 11524, 10627.*

POLYOSMA Blume

POLYOSMA LAGUNENSIS sp. nov.

Species *P. philippinensis* affinis, differt foliis subtus ad nervos adpresse hirsutis, nervis magis numerosis, floribus minoribus.

A small tree 5 to 8 m high, the older branches terete, light-gray or pale-brownish, the younger branchlets and inflorescences rather densely pubescent with pale-fulvous, short, appressed hairs. Leaves opposite, mostly oblong to obovate-oblong, chartaceous, 8 to 14 cm long, 3 to 6 cm wide, narrowed above to the abruptly, slenderly, and sharply acuminate apex, the acumen somewhat apiculate, and below to the cuneate base, entire or

with minute, scattered teeth opposite the ends of some of the nerves, the upper surface, when dry, dark brownish-olivaceous, slightly shining, smooth, glabrous, the lower surface paler, appressed hirsute with fulvous hairs on the midrib and lateral nerves; lateral nerves 12 to 15 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations lax; petioles fulvous-pubescent, 2 to 2.5 cm long, in age becoming nearly glabrous. Racemes terminal, many flowered, solitary, 10 to 14 cm long, densely hirsute with short, fulvous hairs. Flowers white, somewhat crowded, their pedicels 3 mm long, the bracteoles usually 3, lanceolate, acuminate, 2 to 2.3 mm long. Calyx hirsute, 2 to 2.5 mm long, the lobes lanceolate-ovate, acuminate, 0.8 mm long. Petals 4, linear-lanceolate, 8 to 9 mm long, about 2 mm wide at the base, narrowed upward to the acute apex, prominently 5-nerved, the nerves dark-colored, outside hirsute. Filaments flattened, hirsute inside, about 4 mm long; anthers linear, narrower than the filaments, 3 mm long. Style glabrous, 8 mm long. Fruit subglobose, not rugose, sparingly pubescent, 7 to 8 mm in diameter.

LUZON, Province of Laguna, near San Antonio and Paete, *Bur. Sci. 2393* (type), *14960, 10056 Ramos, For. Bur. 13185 Curran*, flowering in February and March, fruiting June and July.

A species manifestly closely allied to *Polyosma philippinensis* Merr., from which it differs in its smaller flowers, and its more numerously nerved leaves which are appressed-pubescent on the midrib and nerves on the lower surface, not glabrous. Another close ally appears to be the recently described *Polyosma gitingensis* Elm., which, however, has glabrous leaves, even smaller flowers, and much larger bracteoles.

POLYOSMA LINEARIBRACTEA sp. nov.

Arbor, omnibus partibus plus minusve pubescentibus vel hirsutis; foliis crasse coriaceis, oppositis, oblongis, usque ad 17 cm longis, utrinque acutis, apice mucronatis, margine grosse distanter serratis; nervis utrinque circiter 12, subtus valde prominentibus; racemis terminalibus, solitariis, circiter 15 cm longis; fioribus circiter 2.4 cm longis, bracteolis linearis, elongatis, 8 ad 12 mm longis.

A tree said by the collector to be 20 m high, the branches terete, dark-brown, glabrous, the younger branchlets, the leaves, and the inflorescence more or less densely hirsute with grayish-brown hairs. Leaves thickly coriaceous, oblong, 12 to 17 cm long, 4 to 5 cm wide, narrowed about equally to the acute base and apex, the apex also mucronate, the upper surface, when young, appressed-hirsute, in age becoming glabrous, shining, greenish-olivaceous, the lower surface paler, rather prominently hirsute

on the midrib and nerves, becoming nearly glabrous, the margins rather coarsely and distantly apiculate or glandular-serrate, the teeth corresponding to the lateral nerves; lateral nerves about 12 on each side of the midrib, curved, anastomosing, very prominent on the lower surface, the reticulations lax, prominent; petioles 2 to 3 cm long, hirsute, becoming nearly glabrous. Racemes terminal, solitary, about 15 cm long, densely hirsute, the rachis rather stout. Flowers pale-lavender, about 30 in each raceme, their densely hirsute pedicels about 4 mm long, the bracteoles 3 at the apices of the pedicels, linear, hirsute, the two lateral ones 8 to 9 mm long, 0.5 mm wide or less, the middle one up to 12 mm long and a little wider than the lateral ones. Calyx somewhat hirsute, including the lanceolate, acuminate calyx-teeth about 6 mm long. Petals 4, about 2.5 cm long, 2.2 mm wide, scarcely narrowed upward, with about 4, dark-colored nerves, hirsute, the apex thickened. Filaments slender, scarcely flattened, 8 to 9 mm long, sparingly pubescent; anthers linear, about as wide as the filament, obtuse, 6 to 7 mm long. Style about 1.7 cm long, slender.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19656 McGregor*, February, 1913.

A most striking species, at once distinguished from all known Philippine forms by its large flowers and very prominent, linear, elongated bracteoles.

CUNONIACEAE

WEINMANNIA Linnaeus

WEINMANNIA LUCIDA sp. nov. § *Leiospermum.*

Arbor circiter 10 m alta inflorescentiis exceptis glabra; foliis 3- vel 5-foliolatis, usque ad 15 cm longis, foliolis subcoriaceis, lanceolatis vel oblongo-lanceolatis, in siccitate brunneis, utrinque valde nitidis, longe acuminatis, basi acutis, margine distanter crenato-serratis, reticulis laxis, haud prominentibus; racemis multifloris, folia subaequantibus, pubescentibus; floribus 4-meris, sepalis caducis.

A tree about 10 m high, glabrous except the inflorescence. Branches grayish, terete, the younger parts brownish. Leaves opposite, 9 to 15 cm long, the rachis and petiole quite glabrous; leaflets 3 or 5, lanceolate or oblong-lanceolate, subcoriaceous, strongly shining, brownish and of the same color on both surfaces when dry, 5 to 10 cm long, 1.5 to 4 cm wide, the apex slenderly acuminate, the acumen blunt, the base acute, the margins slightly and distantly crenate-serrate; lateral nerves about 10 on each side of the midrib, slender, not prominent,

the reticulations lax, slender, rather obscure; petiolules of the lateral leaflets 2 to 3 mm long, that of the terminal one much longer. Inflorescence in the upper axils and subterminal, uniformly pubescent with short, rather closely arranged hairs, the common peduncles thick, flattened, about 5 mm long, each bearing at its apex 4 elongated racemes arranged in one plane; racemes up to 10 cm long, many-flowered. Flowers 4-merous, their pedicels slender, pubescent, 2.5 to 3 mm long, solitary or somewhat fascicled along the rachis. Sepals oblong, obtuse or subacute, 0.8 mm long, deciduous, leaving in fruit a disk-like base nearly 1 mm in diameter and bearing 8 marginal glands. Petals elliptic, rounded, about 1.2 mm long. Stamens 8; filaments 1 to 1.2 mm long; anthers heart-shaped, 0.3 mm long. Capsules oblong, narrowed at both ends, the base acute, apex acuminate, 4 to 5 mm long including the two styles, 1 to 2 mm in diameter, uniformly pubescent with scattered, short hairs, the styles 1 to 1.5 mm long.

LUZON, Province of Laguna, Dahican, in forests along the river, *Phil. Pl. 1109 Ramos*, September 17, 1912.

A species manifestly allied to *Weinmannia luzoniensis* Vid., from which it differs in its entirely glabrous leaves, but more especially in its much narrower, differently shaped leaflets which are only slightly toothed, strongly shining on both surfaces, and with slender, laxly arranged veins and reticulations. Several of the Philippine representatives of this genus find their closest allies (§ *Leiospermum*) in Polynesia, not in the Malayan region.

LEGUMINOSAE

ALBIZZIA Durazzini

ALBIZZIA MYRIANTHA sp. nov.

Arbor circiter 20 m alta, inflorescentiis exceptis glabra; foliis bipinnatis, circiter 35 cm longis, petiolo basi supra 1-guanduloso, rhachibus glandulis 2 vel 3 instructis; pinnis circiter 10 utrinque, 10 ad 14 cm longis; foliolis circiter 30 utrinque, oblongis, equilateralibus, basi obtusis, apice rotundatis, circiter 1.5 cm longis, costa centralis; inflorescentiis axillaribus folia aequantibus, racemoso-paniculatis; floribus numerosis, albido-viridis, pedicellatis, ad apices ramulorum racemoso-capitatis.

A tree about 20 m high, glabrous except the inflorescence. Branches subterete, very dark-colored when dry, slightly lenticellate. Leaves bipinnate, about 35 cm long, the petiole with a large gland near the base, the rachis with 2 or 3 smaller glands in the upper part; pinnae about 10 on each side of the rachis, opposite, the secondary rachises with glands in the upper one-half, 10 to 14 cm long; leaflets opposite, about 30 pairs on

each pinna, oblong, chartaceous l to 1.8 cm long, 5 to 7 mm wide, equilateral, the midrib c al, apex rounded, base obtuse or rounded the lateral nerves ab t 6 on each side of the midrib, indistinct, the upper surface olivaceous, shining when dry, the lower paler. Panicles in the upper axils, usually one in each axil, as long as the leaves, narrow, the whole forming a terminal leafy inflorescence, sparingly fulvous-pubescent; primary branches confined to the upper 10 cm, spreading, solitary or fascicled, scattered below, rather crowded toward the apices, 5 cm long or less, each branch bearing near its apex numerous, racemose-capitate, greenish-white flowers, the heads, including the anthers, about 3 cm in diameter. Pedicels about 2 mm long, appressed-pubescent with short fulvous hairs. Calyx narrowly funnel-shaped, about 4 mm long, sharply 5-toothed, densely appressed fulvous pubescent. Corolla narrowly funnel-shaped, twice as long as the calyx, 5-lobed, the lobes 2 mm long or less, oblong, acute; stamens long-exserted.

PALAWAN, Taytay, *Merrill 9259*, May 15, 1913, in forests near the sea and slightly above sea level.

A very characteristic species apparently most closely allied to *Albizzia pedicellata* Baker, of the Malay Peninsula.

PARKIA R. Brown

PARKIA SHERFESEEI sp. nov.

Arbor alta, plus minusve ferrugineo-pubesecentibus; foliis citer 50 cm longis; pinnis 8- ad 12-jugatis, inferioribus brevioribus; foliolis 11- ad 16-jugatis, oblongis, coriaceis, usque ad 2.5 cm longis, 1 cm latis, sessilibus, basi subtruncatis, apice rotundatis vel leviter inaequilateraliter retusis; pedunculis usque ad 30 cm longis, inflorescentiis junioribus obovoideis, dense ferrugineo-pubescentibus.

A tree reaching a height of 27 meters, the trunk 1.2 m in diameter, the young branchlets, rachis, secondary rachises, peduncles and inflorescence rather prominently ferruginous-pubescent with short hairs. Leaves up to 50 cm long, the pinnae 8 to 12 pairs, the lower ones about 10 cm long, the intermediate and upper ones up to 16 cm long; leaflets coriaceous, rather pale when dry, oblong, up to 2.5 cm long, and 1 cm wide, sessile, base rounded-truncate, inequilateral, apex rounded or somewhat inequilaterally retuse, the lateral nerves slender, anastomosing, indistinct. Peduncles up to 30 cm long, the inflorescence (in bud) obovoid or pyriform, rather abruptly contracted below the middle, 4 to 5 cm long, about 2.5 cm in diameter, the bracteoles densely imbricate, spatulate, about 7 mm long, glabrous

except the upper exposed portion which is densely ferruginous-pubescent. Calyx about 7 mm long, the tube glabrous, the lobes densely pubescent.

MINDANAO, Agusan Subprovince, near Butuan, *For. Bur. 21962 Sherfesee, Cenabre, & Ponce*, May 22, 1914, along nipa swamps at sea level, locally known as *cunding*.

A very characteristic species, recognizable at once by its ferruginous indumentum, its very dense inflorescences, and its unusually large leaflets.

PITHECOLOBIUM Martius

PITHECOLOBIUM CAULOSTACHYUM sp. nov.

Arbor 5 ad 10 m alta, subglabra; foliis bijugatis, circiter 20 cm longis, pinnis 6-foliolatis, foliolis chartaceis, lanceolatis vel oblongo-lanceolatis, usque ad 11 cm longis, acuminatis, basi acutis, nervis utrinque circiter 9; paniculis parce breviter hirsutis, paucifloris, usque ad 5 cm longis, plerumque fasciculatis, caulinis et in ramis vetustioribus, corolla circiter 5 mm longa.

A tree 5 to 10 m high, the panicles mostly fascicled on the trunk and larger branches. Branchlets slender, grayish-brown, glabrous, the younger ones somewhat puberulent. Leaves 1-jugate, about 20 cm long, the rachis 2 to 3 cm long, slightly puberulent, usually with two prominent glands, one between the pinnae, and one at the upper two-thirds; pinnae with 6-leaflets opposite, the lower subalternate, rachis puberulent, with one gland between each of the two upper pairs of petiolules and usually one gland below the lowermost leaflet. Leaflets chartaceous, lanceolate or oblong-lanceolate, 7 to 11 cm long, 2 to 3 cm wide, dark-brownish when dry, shining, glabrous, the apex rather slenderly and sharply acuminate, base acute; lateral nerves about 9 on each side of the midrib, slender, anastomosing; petiolules 2 mm long or less, puberulent, becoming glabrous. Panicles fascicled, mostly on the trunk and larger branches, occasionally a few on the ultimate branchlets, 5 cm long or less, few-flowered, sparingly hirsute with short hairs. Flowers white, two or three subcapitately disposed at the tip of each ultimate branchlet, the subtending bracteoles narrow, about 1 mm long. Calyx cup-shaped, about 1.5 mm long, glabrous or nearly so, the teeth short, acute. Corolla campanulate, about 5 mm long, the tube 2.5 mm long, the lobes as long as the tube, recurved, oblong, obtuse or subacute. Stamens about 25, the free portions of the filaments about 1 cm long, the lower 2 to 3 mm united into a tube. Ovary glabrous, oblong-cylindric, 2 mm long; style slender, about 13 mm long.

SAMAR, Mount Cauayan, *Phil. Pl. 1637 Ramos*, April, 1914, on forested slopes.

The most striking character of this species is its cauline inflorescence. It is manifestly allied to *Pithecolobium pauciflorum* Benth., but differs not only in the disposition of its inflorescences, but in its very differently shaped, more numerously nerved leaflets. In vegetative characters it closely resembles *Pithecolobium bigeminum* Benth. as represented by Thwaites *C. P. 644.*

PITHECOLOBIUM MULTIFLORUM sp. nov.

Arbor 6 or 8 m alta partibus junioribus inflorescentiisque plus minusve ferrugineo-pubescentibus; foliis circiter 40 cm longis, bijugatis, pinnis inferioribus 4-foliolatis, superioribus 8-foliolatis, foliolis subcoriaceis, oblongis vel oblongo-lanceolatis, breviter obtuse acuminatis, basi acutis ad subrotundatis, usque ad 14 cm longis, nervis utrinque circiter 9, subtus prominentibus; paniculis terminalibus, quam folia longioribus, e basi ramosis, multifloris; floribus subcapitatis, capitulis 4- vel 5-floris, in ramulis plus minusve confertis, petalis fere liberis.

A tree 6 to 8 m high, closely allied to *Pithecolobium ellipticum* Hassk., the branches dark-colored when dry, glabrous or nearly so, the branchlets sparingly brown-pubescent with short hairs, the primary and secondary rachises of the leaves and the inflorescence with similar hairs, the younger parts of the inflorescence densely ferruginous-pubescent. Leaves about 40 cm long, evenly 2-jugate, the rachis about 10 cm long, with a single very large and prominent gland about 1.5 cm above the base, none between the pinnae; lower pinnae 2-jugate, the rachis about 3.5 cm long, with a gland between the petioles of the distal leaflets; upper pinnae 4-jugate, about 30 cm long, with a large gland between the upper two pairs of petiolules, the lower two leaflets alternate, the others opposite. Leaflets subcoriaceous, oblong to rather broadly oblong-lanceolate, entirely glabrous, shining, brownish-olivaceous, the lateral ones somewhat falcate or inequilateral, shortly and bluntly acuminate, base acute to somewhat rounded, or at least rounded on one side of the petiolule, the lower ones smaller than the upper, 8 to 14 cm long, 3.5 to 5 cm wide; lateral nerves about 9 on each side of the midrib, prominent; petiolules about 5 mm long. Panicles terminal, ample, many-flowered, branched from or near the base, as long as or longer than the leaves, the lower branches up to 40 cm in length, the secondary branches in the upper two-thirds. Flowers in small heads on the ultimate branchlets, the heads 4- or 5-flowered, often crowded, the subtending bracteoles ovate, about 1 mm long. Calyx brown, about 3 mm long, rather

densely appressed-pubescent with short, shining, tawny hairs, the teeth broad, subacute, 0.5 mm long. Corolla and stamens straw-colored, the petals free quite to the base or merely slightly connate below, about 6 mm long, 2 mm wide, acute or obtuse, pubescent externally. Stamens indefinite, the filaments at least 1 cm long, the lower 2 mm united into a tube. Pods unknown.

LUZON, Benguet Subprovince, railroad grade west of Baguio, *Phil. Pl. 1779 Merrill* May, 1914, in ravines along small streams, altitude about 1,300 meters.

A species manifestly closely allied to *Pithecolobium ellipticum* Hassk., from which its differs in its very differently shaped, smaller, more numerously nerved leaflets, its petals free or nearly so, and other characters; the duplicates were erroneously distributed as *Pithecolobium platycarpum* Merr., to which species the present form is not closely allied.

NEPTUNIA Loureiro

NEPTUNIA OLERACEA Lour. Fl. Cochinch. (1790) 654.

MINDANAO, Butuan Subprovince, Bunauan, *E. H. Taylor*, September, 1913.

Widely distributed in the tropics of both hemispheres.

This species was credited to the Philippines by F.-Villar,[5] but was excluded by me[6] as at the time I revised the Philippine Leguminosae as F.-Villar's record was based on *Cuming 2352*, which was from Malacca, not from the Philippines. Taylor's specimen is the first collection of the species in the Philippines.

KOOMPASSIA Maingay

KOOMPASSIA EXCELSA (Becc.) Taubert in Engl. & Prantl Nat. Pflanzenfam. 3[8] (1891) 156; Bericht Deutsch. Bot. Ges. 10 (1892) 641, *t. 32, f. 1–3.*

Abauria excelsa Becc. Malesia 1 (1877) 169; Nelle Foreste di Borneo (1902) 172, *f. 34.*

PALAWAN, Alphonso III, *For. Bur. 21580 Danao*, May 10, 1914, in forests, altitude about 20 meters, flowers fragrant, light-yellow, locally known by the Tagbanuas as *manggis.*

Beccari proposed the genus *Abauria* for this plant, but Taubert has reduced it to *Koompassia*, although the fruits are not definitely known. The Palawan specimen is manifestly identical with the Bornean species, agreeing in all essentials with Beccari's description and figure, and with a Sarawak specimen, *Foxworthy 334*, collected under the native name *tapang*, the same native name cited by Beccari. Dr. Foxworthy's specimen is sterile, but with it is a detached fruit, picked up from the ground, which may or may not belong to the species; this fruit is the characteristic winged one of *Koompassia*, strongly resembling that of *Koompassia beccariana* Taubert. A very interesting addition to the few known species confined to the Philippines and Borneo, most of which are not found in the Philippines proper but in Palawan and in the Sulu Archipelago.

[5] Novis. App. (1880) 73.
[6] Philip. Journ. Sci. 5 (1910) Bot. 136.

CYNOMETRA Linnaeus

CYNOMETRA COPELANDII (Elm.) comb. nov.

Gleditschia copelandii Elm. Leafl. Philip. Bot. 2 (1910) 695.

SIBUYAN, *Elmer 12234*, April, 1910 (type number).

The species is in all essential characters a member of the *Cynometreae-Caesalpinioideae*, not of the *Eucaesalpineae*. It is anomalous in *Cynometra* in that the ovules are solitary. The species is an exceedingly characteristic one, notably in its leaf-characters.

BAUHINIA Linnaeus

BAUHINIA PAUCIFLORA sp. nov. § *Phanera.*

Frutex scandens inflorescentiis exceptis glaber vel subtus foliis ad nervos parce pubescentibus; foliis oblongo-ovatis, usque ad 10 cm longis, 9- vel 11-nerviis, basi cordatis, 2-lobatis, lobis vix ad medium coalitis, oblongis, obtusis, racemis terminalibus, pauci-floris, floribus magnis, calycis tubo elongatis, angustis, 2 ad 2.5 cm longis, petalis oblongo-obovatis, 4 ad 4.5 cm longis.

A scandent shrub, nearly glabrous except the brown-pubescent inflorescence, the branches terete, brownish, glabrous. Leaves alternate, oblong-ovate, 8 to 10 cm long, 4.5 to 6 cm wide, chartaceous, the upper surface olivaceous, shining, the lower a little paler, shining, often with few short hairs on the nerves, the base distinctly cordate, 2-lobed, the lobes oblong, obtuse, extending about two-thirds to the base, the midrib of the leaf excurrent as a slender, acicular, 4 mm long awn; nerves 9 to 11, prominent; petioles slender, 3 to 4 cm long. Racemes terminal, few flowered, pubescent with short brown hairs, the rachis and peduncle 10 cm long or less. Flowers on the type two or three in each raceme, their pedicels pubescent, 2 cm long, the subtending bracteoles ovate, pubescent, about 5 mm long. Calyx-tube cylindric, 2 to 2.5 cm long, 3 mm in diameter, brown-pubescent, the lobes lanceolate, acuminate, pubescent externally, 2.5 to 3 cm long, 0.5 cm wide, the limb, in bud, ovoid-oblong, about 2 cm in length. Petals oblong-obovate, obtuse, glabrous, white or somewhat yellowish, narrowed to the short claws. Fertile stamens 3, the anthers oblong, 1 cm in length. Ovary pubescent with appressed, brown, deciduous hairs; style glabrous.

LUZON, Province of Tayabas, Dap-Dap Point, *Bur. Sci. 18113 Foxworthy & Ramos*, March, 1911, in forests.

A well marked species manifestly allied to *Bauhinia warburgii* Perk., but with very differently shaped leaves, the lobes much narrower.

CANAVALIA DeCandolle

CANAVALIA MACROBOTRYS sp. nov.

Scandens, racemis obscure pubescentibus exceptis glabra; foliolis chartaceis, ovatis, prominente acute acuminatis, basi

rotundatis, usque ad 14 cm longis, nervis utrinque 4 vel 5, subtus prominentibus; racemis axillaribus, circiter 70 cm longis; floribus roseis, 3 cm longis, breviter pedicellatis.

A scandent apparently herbaceous plant, glabrous except the slightly pubescent inflorescence, the branches slender, terete, greenish-straw-colored when dry. Petioles about 7 cm long, the rachis extended 3 to 4 cm above the insertion of the lateral leaflets. Leaflets ovate, chartaceous, 12 to 14 cm long, about 7.5 cm wide, olivaceous and shining when dry, apex rather slenderly and prominently acuminate, the acumen apiculate, base rounded, the central leaflet equilateral, the lateral ones somewhat inequilateral; lateral nerves 4 or 5 on each side of the midrib, prominent on the lower surface; petiolules about 7 mm long. Racemes axillary, solitary, about 70 cm long, the lower 25 to 30 cm without flowers, the rest with prominent alternate nodes, flowering in sequence from the base upward, the flowers below falling, persisting only in the apical part. Flowers pink, about 3 cm long, short-pedicelled, the calyx about 1.5 cm long, the upper lip cleft, very much larger than the lower lip. Standard about 2.5 cm wide, retuse.

SAMAR, Cauayan Valley, *Bur. Sci. 17517 Ramos*, March 14, 1914.

A species strongly characterized by its rather slenderly acuminate, prominently nerved leaflets and especially by its greatly elongated racemes which reach a length of at least 70 cm.

KUNSTLERIA Prain

KUNSTLERIA ATRO-VIOLACEA (Elm.) comb. nov.

Derris atro-violacea Elm. Leafl. Philip. Bot. 5 (1913) 1798.

The type is *Elmer 13105*, from Palawan, in flower, April, 1911. Although the fruits are unknown I do not hesitate to transfer the species to *Kunstleria*.

DALBERGIA Linnaeus f.

DALBERGIA SUBALTERNIFOLIA (Elm.) comb. nov.

Derris subalternifolia Elm. Leafl. Philip. Bot. 5 (1913) 1801.

The type is *Elmer 12965* from Palawan, in flower, April, 1911, and is in all respects a *Dalbergia*, not a *Derris*. It seems to be allied to *Dalbergia densa* Benth. which extends from Amboina and New Guinea to Australia, and may not prove to be distinct from Bentham's species. Elmer's specimen has 3-foliolate leaflets which are distinctly coriaceous; *Merrill 9345*, from Palawan, which is probably referable to the same species, however, has much thinner leaflets varying in number from 2 to 5.

DALBERGIA RETICULATA sp. nov. § *Sissoa, Podiopetalum.*

Frutex scandens, subglaber; foliis circiter 10 cm longis, 5- ad 7-foliolatis, foliolis chartaceis, late elliptico-ovatis, vel late ellip-

ticis, rotundatis vel leviter retusis, usque ad 4.5 cm longis; inflorescentiis axillaribus, racemosis, brevibus, paucifloris; staminibus monadelphis; leguminibus anguste oblongis, membranaceis, samaroideis, circiter 7 cm longis, 1.3 ad 2 cm latis, omnibus partibus valde reticulatis; seminibus 1 vel 2.

A scandent shrub, glabrous except the somewhat pubescent inflorescence and the leaflets which are very sparingly pubescent on the lower surface. Branches brownish, wrinkled when dry, lenticellate. Leaves alternate, about 10 cm long, each with from 5 to 7 leaflets, the leaflets opposite or alternate, membranaceous or chartaceous, broadly elliptic-ovate to broadly elliptic, somewhat brownish when dry, lower surface a little paler than the upper, rounded at both ends or the apex slightly retuse, the lower surface with few, scattered, brownish, very short hairs, the upper surface glabrous; lateral nerves about 8 on each side of the midrib, slender, not prominent; petiolules 2 to 3 mm long. Inflorescence racemose, axillary, solitary, few-flowered, the racemes sparingly pubescent, 2.5 to 4 cm long. Calyx sparingly pubescent, about 3.5 mm long. Wings about 6 mm long, the lamina about 3 mm long, 1.6 mm wide, obtuse or rounded, base acute on one side, rounded on the other, the claw very slender, as long as the lamina; standard and keel not seen. Stamens all united into a sheath split down one side to the base. Pods narrowly oblong, membranaceous, about 7 cm long, 1.3 to 2 cm wide, apex rounded and minutely apiculate, base somewhat decurrent and with a slender stalk about 8 mm long, all parts of the valves prominently and rather laxly reticulate; seeds one or two, central, immature.

LUZON, Province of Laguna, Mount Maquiling, *For. Bur. 21406 Villamil*, April 20, 1914, in forests along the Molauin trail beyond the hot springs, altitude about 500 meters.

A very characteristic species, anomalous in the genus in its racemose inflorescence, and further characterized by its very thin, prominently reticulate pods. The specimen is with immature fruits, but portions of the flower were found on one raceme, leaving very little doubt as to the correctness of the genus and section.

MELILOTUS Tournefort

MELILOTUS INDICA (Linn.) All. Fl. Ped. 1 (1785) 308.

Trifolium melilotus-indica Linn. Sp. Pl. (1753) 765.

LUZON, Benguet Subprovince, Baguio, *Merrill 9700*, May, 1914, disturbed soil along the railroad grade, also as a weed in the Forestry nursery.

A plant of wide distribution, recently introduced into the Philippines.

STRONGYLODON Vogel

STRONGYLODON PAUCINERVIS sp. nov.

Frutex scandens glaber; foliis 3-foliolatis, foliolis chartaceis, ovatis, obscure latissime obtuse acuminatis, usque ad 12 cm longis, nervis utrinque circiter 5; racemis ut videtur caulinis, fasciculatis, circiter 20 cm longis, multifloris, floribus azureo-violaceis ad nodos leviter elongatis subracemose dispositis, curvatis, circiter 3 cm longis.

A scandent glabrous vine of large size, the branchlets terete, brownish, 3 to 4 mm in diameter. Leaves 3-foliolate, their petioles 6 to 9 cm long, the stipules oblong, obtuse, strongly nerved, about 4 mm long, deciduous, the stipels linear, about 3 mm long; leaflets chartaceous, the terminal one equilateral, the lateral ones strongly inequilateral, ovate, 10 to 12 cm long, 5 to 6 cm wide, obscurely, very broadly, and bluntly acuminate, base rounded, shining, subolivaceous; lateral nerves about 5 on each side of the midrib, prominent; petiolules about 8 mm long. Racemes apparently from the trunk, at least three in a fascicle, about 20 cm long, many flowered, the peduncles 4 to 6 cm long. Flowers bluish-violet, about 3 cm long, corolla upcurved at nearly right angles at about the middle, in bud nearly straight or only slightly falcate, the nodes produced as short, about 5 mm long, branchlets, the flowers racemosely arranged on the produced nodes. Pedicels 1 cm long or less. Calyx cup-shaped, about 6 mm long, margins wavy. Standard about 3 cm long, when spread nearly 2 cm wide, curved upward at about the middle, rostrate-acuminate. Wings slightly falcate, the claw about 8 mm long, the lamina oblong, rounded, 1.5 cm long, 6 mm wide. Keel strongly curved upward, 4 cm long, when spread 2 cm wide, rostrate-acuminate. Ovary long stipitate, the ovules about 5.

BILIRAN, *Bur. Sci. 18858 McGregor*, June 22, 1914, a very large vine in forests, altitude about 300 meters.

Among the Philippine species with short racemes well characterized by its fascicled racemes, its produced nodes, its numerous flowers, and its few-nerved leaflets.

STRONGYLODON MEGAPHYLLUS sp. nov.

Scandens, ramulis junioribus exceptis glaber; foliolis oblongo-ovatis, coriaceis, in siccitate brunneis, usque ad 28 cm longis, basi subacutis, apice obtusis vel retusis, nervis utrinque circiter 8, subtus prominentibus; inflorescentiis angustissime paniculatis, 30 ad 40 cm longis, ut videtur multifloris; floribus azureo-violaceis, 5 vel 6 cm longis.

A scandent plant, apparently of large size, quite glabrous

except the young branchlets which are more or less appressed-pubescent, the branches brown, terete, 4 to 5 mm in diameter. Leaves 3-foliolate, the leaflets oblong-ovate, coriaceous, brown and shining when dry, glabrous, 20 to 28 cm long, 9 to 16 cm wide, subequally narrowed to the acute or subacute base and to the blunt or somewhat retuse apex, equilateral, the lateral nerves about 8 on each side of the midrib, prominent on the lower surface, the petioles about 1 cm long. Racemes 30 to 40 cm long, apparently many-flowered, narrowly paniculate, flower bearing in the upper two-thirds, the branchlets from the nodes 1 to 1.5 cm long, each bearing several flowers, judging from the scars of fallen pedicels. Pedicels 1.5 to 2 cm long. Calyx about 1 cm long, nearly 1 cm in diameter, truncate, the upper side somewhat gibbous. Corolla blue-violet in color, very strongly recurved. Standard about 5 cm long, 2.5 cm wide, very sharply bent upward and backward from the mouth of the calyx, acuminate, pubescent inside in the median portion below, auriculate at the sharp curve inside; wings strongly falcate-curved, their claws 1.5 cm long, the lamina 2.5 cm long, 1 cm wide, obtuse, one side auriculate at the base. Keel very strongly recurved, when straightened out about 7 cm long, long-acuminate, rostate. Fruit apparently fleshy, when dry falcate-ovoid, about 5 cm long, 2.5 cm in diameter, not compressed, beaked at the apex, contracted at the base into a short stipe.

LUZON, Province of Rizal, Montalban, *Loher 5935*, April 15, 1906.

The most strongly marked species known from the Philippines, at once recognizable by its unusually large leaflets, its large flowers, and the nodes of the racemes produced as slender branchlets up to 1.5 cm in length, making the inflorescence a narrow panicle rather than a true raceme.

LUZONIA Elmer

LUZONIA PURPUREA Elm. Leafl. Philip. Bot. 1 (1907) 220.

This genus and species were described from flowering specimens. The fruits are fleshy, oblong to oblong-obovoid in outline, when fresh somewhat fleshy, cylindric, not at all compressed, about 12 cm long, 5.5 cm thick, smooth, shining, purple, short-apiculate at the apex, the valves very thick, apparently tardily dehiscent, firm, fleshy, greenish-white in color, 1 to 1.5 cm thick; sutures not prominent. Seeds usually 4 in each pod, ellipsoid, about 3 cm long and 2 cm thick.

LUZON, Benguet Subprovince, Pacdal, *Merrill 9685*, May, 1914.

MILLETTIA Wight & Arnott

MILLETTIA BRACHYCARPA sp. nov.

Arbor circiter 7 m alta, inflorescentiis exceptis glabra; foliis circiter 20 cm longis, imparipinnatis, foliolis circiter 7, oblongo-ovatis, subcoriaceis, breviter acuminatis, usque ad 13 cm longis;

floribus ignotis, racemis axillaribus, solitariis, usque ad 10 cm longis; leguminibus 1-spermis, oblongo-ellipticis, 6 cm longis, 3 cm latis, 1 cm crassis, utrinque angustatis, basi acutis, apice rostrato-acuminatis, valvis lignosis.

A tree about 7 m high, glabrous except the inflorescence. Branches terete, lenticellate, grayish or reddish-brown. Leaves alternate, odd-pinnate, the petiole and rachis 10 to 12 cm long; leaflets usually 7, subcoriaceous, ovate to oblong-ovate, up to 13 cm long and 4.5 cm wide, the apex shortly and obtusely acuminate, the base usually rounded, equilateral or somewhat inequilateral, the upper surface brownish-olivaceous when dry, shining, the lower paler; lateral nerves about 9 on each side of the midrib, prominent; petiolules 5 to 8 mm long. Flowers not known, the persistent rachises of the racemes axillary, solitary, thickened, somewhat pubescent, with numerous thickened protuberances. Pods brown when dry, oblong-elliptic, 1-seeded, woody, about 6 cm long, 3 cm wide, and at least 1 cm thick, narrowed below to the acute base and above to the rostrate-acuminate apex, glabrous, the corners rounded, not angled, the valves woody, shining, smooth. Seed solitary, subelliptic, somewhat narrowed to the rounded ends, about 3.5 cm long, 2.3 cm wide, and nearly 1 cm thick.

PALAWAN, Silanga, in deserted clearings on slopes, *Merrill 9578*, May 24, 1913.

A species well characterized by its very thick, woody, 1-seeded pods.

CROTALARIA Linnaeus

CROTALARIA ORIXENSIS Willd in Ges. Naturf. Fr. Neue Schr. 4 (1803) 217; Baker in Hook. f. Fl. Brit. Ind. 2 (1876) 83.

LUZON, Manila, *Bur. Sci. 19145 Guerrero*, December, 1912, in waste places, certainly of recent introduction.

For the identification of the above specimen I am indebted to Sir D. Prain, director of the Royal Gardens, Kew, England, to whom a specimen was sent. The species is of wide distribution in British India (Western Peninsula), in Abyssinia, and is reported from tropical Africa. It is undoubtedly a recent introduction in the Philippines.

SIMARUBACEAE

BRUCEA J. S. Miller

BRUCEA AMARISSIMA (Lour.) comb. nov.

Gonus amarissimus Lour. Fl. Cochinch. (1790) 658.

Brucea sumatrana Roxb. Hort. Beng. (1814) 12, Fl. Ind., ed. Carey, 1 (1832) 449; Hook. f. Fl. Brit. Ind. 1 (1875) 521; Lecomte Fl. Gén. Indo-Chine 1 (1911) 698.

This widely distributed Indo-Malayan species is apparently quite common in the southern Philippines, and is represented in our collections by specimens from Negros, Leyte, Camiguin, Cebu, Palawan, Basilan, and Min-

danao, but is not reported from Luzon unless *Cuming 987* from the Province of Pangasinan is correctly referred here. In our extra-Philippine material it is represented by specimens from Cochin China, southern China, Malay Peninsula, Singapore, and Queensland. Loureiro's specific name, being much the older, is here adopted.

BRUCEA MACROBOTRYS sp. nov.

Frutex 1 ad 2 m altus partibus junioribus inflorescentiisque minute adpresse pubescentibus; foliis usque ad 60 cm longis, 9-foliolatis, foliolis ovatis ad oblongo-ovatis, membranaceis, basi late acutis ad rotundatis, apice tenuiter acuminatis, margine integris vel leviter undulatis, distanter glandulosis, subtus parcissime pubescentibus, nervis utrinque 7 vel 8; paniculis angustis, quam folia longioribus, cymis distantibus, circiter 1.5 cm longis; floribus circiter 2 mm diametro.

An erect shrub 1 to 2 m high, the branches terete, pale-brownish, lenticellate, glabrous, the younger ones somewhat pubescent with short pale hairs as are the inflorescences and parts of the leaves. Leaves up to 60 cm long, the rachis greenish when dry, slightly pubescent; leaflets 9, ovate to oblong-ovate, membranaceous, 12 to 17 cm long, 5 to 6 cm wide, olivaceous and shining when dry, base broadly acute to rounded, apex rather slenderly and sharply acuminate, margins entire or slightly undulate, the incipient teeth indicated by distant marginal glands; lateral nerves 7 or 8 on each side of the midrib; petiolules puberulent, about 6 mm long. Panicles axillary, up to 80 cm long, very narrow, many flowered, the flowers in distant, pubescent, rather many-flowered cymes about 1.5 cm in length, few flowers opening at one time, their pedicels pubescent, slender, 4 to 5 mm long, the staminate ones about 2.2 mm in diameter. Sepals 3, pubescent, oblong, acute, 1 mm long. Petals slightly longer than the sepals, oblong-ovate, obtuse, very slightly pubescent. Stamens about as long as the petals. Fruit ovoid, black when dry, about 12 mm long, distinctly reticulate-rugose.

SAMAR, Cauayan Valley, *Phil. Pl. 1626 Ramos*, April, 1914, in forests along small streams.

A species manifestly allied to *Brucea mollis* Wall. and *B. luzoniensis* Vid., closely approaching some forms of the latter. It differs in its larger leaflets, longer leaves, much longer inflorescences, and larger fruits, but in spite of these different characters may be only a variety of Wallich's species unusually large in size.

CANARIUM Linnaeus

CANARIUM HETEROPHYLLUM sp. nov. § *Choriandra.*

Arbor circiter 9 m alta, floribus exceptis glabra; ramulis tenuibus, teretibus; foliis alternis, 1- ad 3-foliolatis, foliolis

subcoriaceis, 7 ad 16 cm longis, integris, utrinque subaequaliter angustatis, basi acutis, apice acuminatis, nervis utrinque 8 ad 10, subtus prominentibus; infructescentibus axillaribus, solitariis, circiter 10 cm longis, racemosis; fructibus oblongis, circiter 1.5 cm longis, obscure 3-angulatis, apiculatis, breviter pedicellatis, pedicellis calycibusque breviter cinereo-pubescentibus.

A tree about 9 m high, glabrous except the flowers. Branches slender, terete, grayish, the very slender branchlets reddish-brown as are the petioles and rachises. Leaves alternate, the rachis and petiole 2 to 6 cm long, slender; leaflets 1 to 3, subcoriaceous, elliptic-oblong, olivaceous, somewhat shining when dry, entire, of about the same color on both surfaces, 6 to 17 cm long, 3 to 7 cm wide, subequally narrowed to the acute base and to the rather prominently acuminate apex; lateral nerves 8 to 10 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations prominent; petiolules of the lateral leaflets, when present, about 8 mm long, the petioles of the simple leaves up to 3 cm long. Infructescence simple, racemose, axillary, slender, up to 10 cm long, apparently flower bearing only in the upper part. Flowers not seen. Calyx, in fruit, cinereous-pubescent with short hairs, the lobes 3, ovate, acute or obtuse, about 2.5 mm long, the pedicels stout, pubescent, 1.3 mm long. Mature fruits oblong, about 1.5 cm long, about 7 mm in diameter, apiculate, indistinctly, or the upper part distinctly 3-angled, the pericarp 1 mm thick or less, brownish, somewhat wrinkled when dry.

LUZON, Province of Cagayan (or Subprovince of Apayao), Tamoc, *Bur. Sci. 13878 Ramos*, January, 1908.

A species well characterized by its 1- and 3-foliolate leaves, both types occurring on the same branches. In this character it differs from all known species of the genus. On account of its fruit characters and its general aspect I have placed it in the same section with *Canarium villosum* F.-Vill. (*C. cumingii* Engl.).

CANARIUM DOLICHOPHYLLUM sp. nov.

Arbor circiter 18 m alta plus minusve pubescentibus; ramulis incrassatis circiter 1 cm diametro; foliis circiter 70 cm longis, foliolis 13, lanceolatis vel oblongo-lanceolatis, coriaceis, in siccitate pallidis, nitidis, integris, usque ad 25 cm longis et 5 cm latis, apice tenuiter caudato-acuminatis, basi subrotundatis, supra glabris, subtus pubescentibus; nervis utrinque 18 ad 20, subtus valde prominentibus, reticulis primariis subparallelis, prominentibus; infructescentibus axillaribus, racemosis, circiter 20 cm longis, ferrugineo-pubescentibus; fructibus ovoideis ad subellipsoideis, obtusis, glabris vel leviter hirsutis, pallidis,

obscurissime 3-angulatis, circiter 2 cm longis, in siccitate valde rugosis.

A tree about 18 m high. Branchlets thickened, about 1 cm in diameter, brown when dry, pubescent with short, reddish-brown hairs. Leaves up to 70 cm in length, the rachis and petioles glabrous, pale-brown when dry. Leaflets lanceolate to oblong-lanceolate, coriaceous, entire, 20 to 25 cm long, 4 to 5 cm wide, the upper surface pale, shining, the lower ferruginous-pubescent with short hairs on the midrib, nerves, and very prominent reticulations, the base rounded to subacute, nearly equilateral, the apex slenderly caudate-acuminate, the acumen up to 2 cm long, blunt; lateral nerves 18 to 20 on each side of the midrib, very prominent on the lower surface, curved-anastomosing, the reticulations very prominent; petiolules glabrous or slightly pubescent, rugose, 3 to 8 mm long. Infructescence racemose, axillary, solitary, rather stout, about 20 cm long, rather densely ferruginous-pubescent with short hairs, the rachis 4 to 5 mm in diameter. Fruits numerous, on stout peduncles 8 mm long or less, the lower peduncles rarely branched, the persistent calyx-lobes 3, coriaceous, ovate, obtuse, about 4 mm long, the fruits rather pale when dry, glabrous, or with few scattered hairs, ovoid to ellipsoid, about 2 cm long, 1.3 cm in diameter, obtuse, obscurely 3-angled, the pericarp very prominently wrinkled when dry.

MINDANAO, Butuan Subprovince, near Amparo, Agusan Valley, *For. Bur. 20749 Rafael & Ponce*, October 10, 1913, in forests slightly above sea level.

A species well characterized by its long leaves, and especially by its elongated, relatively narrow, caudate-acuminate leaflets which are very prominently reticulate beneath.

CANARIUM LAGUNENSE sp. nov. § *Choriandra* ?

Arbor 12 ad 20 m alta plus minusve breviter brunneo-pubescentibus vel floribus ferrugineo-pilosis; foliis 15 ad 25 cm longis, foliolis 5 vel 6, coriaceis, ellipticis ad oblongo-ellipticis, in siccitate brunneis, nitidis, integris, acuminatis, usque ad 12 cm longis, supra glabris, subtus ad costa nervisque breviter brunneo-puberulis, nervis utrinque circiter 12, subtus valde prominentibus; inflorescentiis axillaribus, folia aequantibus vel paullo longioribus, floribus ♂ numerosis, sessilibus, fasciculatis, 6 ad 7 mm longis, ♀ angustissime paniculatis; fructibus ovoideis, circiter 12 mm longis, apiculatis, extus in siccitate rugosis, glabris, endocarpio osseo, circiter 2 mm crasso.

A tree 12 to 20 m high, branchlets, petioles, inflorescences and leaflets on the nerves and reticulations of the lower surface

more or less covered with very short dark-brown hairs. Branches terete, brownish or grayish, glabrous, lenticellate, 5 to 7 mm in diameter. Leaves 15 to 25 cm long, alternate, the leaflets 5 or 6, coriaceous, brown and shining when dry, entire, 5 to 12 cm long, 4 to 6 cm wide, the apex acuminate, the acumen usually abrupt, short, blunt, the base acute to rounded, mostly nearly equilateral; lateral nerves about 12 on each side of the midrib, very prominent on the lower surface, anastomosing, the reticulations prominent, the nerves, midrib, and reticulations with very short, stout, short, glandlike hairs, the upper surface entirely glabrous; petiolules 5 to 10 mm long; stipules linear-lanceolate, thick, stiff, straight or curved, brown-pubescent, about 5 mm long. Inflorescences axillary, solitary, numerous, equalling or a little longer than the leaves, brown-pubescent, or the flower clusters ferruginous-pubescent. Male flowers numerous, fascicled, the fascicles widely separated, each with numerous ovate, hirsute, 1.2 to 1.8 mm long bracteoles, the flowers sessile. Calyx cylindric, 4 mm long, hirsute, the lobes 3, broadly ovate, obtuse, about 2 mm long. Petals 3, oblong, 6 mm long, 2 mm wide, obtuse, the upper two-thirds externally pubescent. Filaments six, 3 to 3.5 mm long, flattened below and slightly united for the lower 0.5 mm forming an obscure disk; anthers oblong, 1.8 mm long. Rudimentary ovary obovoid, glabrous, 1.5 mm in diameter, more or less evidently 3-cleft and readily separating into three parts. Female or perfect flowers apparently similar to the male, the infructescence narrowly paniculate, the lower branches up to 3 cm in length, each branch with from 1 to 3 fruits, the pedicels stout, 5 to 10 mm long. Mature fruits ovoid, not at all 3-angled, apiculate, about 1.2 cm long, 7 to 8 mm in diameter, the pericarp thin, wrinkled when dry, glabrous, the endocarp 1-celled, bony, about 2 mm thick.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 14945* (type), *20468, 20579 Ramos;* Mount Banajao, *For. Bur. 19722 Barber*, in flower in February, in fruit in April and May, growing in forests up to an altitude of 500 meters.

A species in many characters closely resembling *Canarium villosum* F.-Vill. (*C. cumingii* Engl.), and probably as closely allied to that species as any other. It is distinguished by its very short, dark-brown indumentum which appears on the younger parts of the inflorescence, and on the lower surface of the leaflets. The male flowers are disposed in sessile, dense, distant fascicles and are ferruginous-pubescent.

CANARIUM BARNESII sp. nov. § *Choriandra.*

Arbor circiter 20 m alta a *C. lagunense* differt foliis longioribus, foliolis magis numerosis, 6 vel 7, inflorescentiis multo

brevioribus, 5 ad 10 cm longis, floribus ♀ solitariis, haud fasciculatis.

A tree about 20 m high, most parts except the upper surfaces of the leaflets more or less covered with very short brown hairs. Leaves about 35 cm long, the leaflets 6 or 7, coriaceous, oblong-elliptic to oblong-obovate, 7 to 12 cm long, 3.5 to 6 cm wide, rather dark-brown when dry, the upper surface glabrous, shining, base acute to rounded, apex prominently and abruptly acuminate, the acumen blunt, 1 cm long or less; lateral nerves 12 to 14 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations rather close, prominent; petiolules 1 to 1.5 cm long; stipules stout, stiff, pubescent, curved, about 5 mm long. Spikes 5 to 10 cm long, simple, the flowers scattered below, solitary, above rather close, sessile. Calyx oblong-ovate, about 4 mm long, pubescent, the teeth 3, broadly ovate, obtuse, 1 mm long. Petals 3, narrowly oblong, acute to obtuse, about 5 mm long, 1.5 mm wide, pubescent externally in the upper part. Disk annular, glabrous, rather thick, more or less lobed, 1 mm high or less; filaments 6, slender, 1.5 mm long, attached to the outer upper part of the disk; anthers 1 mm long. Ovary globose-obovoid, pubescent, 1.5 mm in diameter; style stout, pubescent, about 1 mm long, cylindric; stigma capitate, obscurely sulcate.

MASBATE, Marintoc River, collected by *P. T. Barnes*, May, 1903, distributed as *Merrill 2617*. In forests, locally known as *mili-pili*.

A species in facies much resembling *Canarium lagunense* Merr., but with longer leaves, more numerous leaflets, very much shorter inflorescences, the flowers not at all fascicled, and the flowers in structure quite different from those of *C. lagunense*. The indumentum on the younger parts, inflorescence, and lower surfaces of the leaflets is quite the same in both forms.

CANARIUM OLIGANTHUM sp. nov. § *Crassipyrena*.

Arbor, ut videtur alta, partibus junioribus plus minusve puberulis; foliis circiter 70 cm longis, foliolis circiter 9, amplis, integris, chartaceis vel subcoriaceis, in siccitate brunneis, usque ad 25 cm longis, et 11 cm latis, acuminatis, nervis utrinque 15 ad 17, prominentibus; inflorescentiis axillaribus, solitariis, circiter 15 cm longis, anguste paniculatis, paucifloris; floribus longe pedicellatis, ebracteolatis, circiter 8 mm longis.

A tree, apparently tall, the trunk about 50 cm in diameter, the branchlets, petioles, midribs on the lower surface of the leaflets, and inflorescence more or less puberulent with pale-brownish hairs. Branches terete, lenticellate, stout, striate, the ultimate branchlets about 1 cm in diameter, pale-brownish.

Leaves ample, up to 70 cm long, the petiole long, about 5 mm in diameter, and with the rachis and petiolules puberulent; leaflets ovate to oblong, 15 to 25 cm long, 8 to 11 cm wide, chartaceous to subcoriaceous, brown and shining when dry, the lower surface a little paler than the upper, entire, apex acuminate, base rounded, subtruncate, or slightly cordate, broad, equilateral, the upper surface quite glabrous, the lower pubescent on the midrib; petiolules ½ to 2 cm long; stipules not seen, apparently early deciduous. Panicles axillary, solitary, 15 cm long or less, narrowly pyramidal, branched at or above the middle, the branches few, scattered, the lower ones 2.5 cm long or less, each branch with one or two long-pedicelled, ebracteolate flowers, or if the bracteoles are present then small and early deciduous; pedicels 1 cm long or less. Flowers 3-merous, about 8 mm long, the calyx cylindric, 6 to 7 mm long, puberulent, the teeth three, broadly triangular-ovate, acute, 2 mm long. Petals 3, oblong, obtuse, 6 to 7 mm long, 3 mm wide, the upper one-third spreading. Stamens 6; filaments 2 mm long, nearly free, flattened and slightly enlarged below, apparently connate into a short obscure disk. Ovary ellipsoid, glabrous, about 4 mm long, narrowed upward into the short, cylindric, stout, 1 mm long style; stigma capitate.

MASBATE, Marintoc River, *P. T. Barnes*, May, 1903, distributed as *Merrill 2618*. In forests along the river, altitude about 16 m, locally known as *pili* and yielding a white resin.

A species manifestly allied to *Canarium luzonicum* A. Gray, but well characterized by its large leaves, ample leaflets, and especially by its narrowly pyramidal, few-flowered panicles, the flowers ebracteolate, their pedicels about 1 cm long.

CANARIUM NITENS sp. nov.

Arbor circiter 15 m alta, inflorescentiis puberulis exceptis glabra; foliis usque ad 35 cm longis, 7- vel 9-foliolatis, foliolis crasse coriaceis, utrinque nitidis, integris, oblongis, acuminatis, 8 ad 13 cm longis, nervis utrinque circiter 10, subtus prominentibus; paniculis obscure brunneo-puberulis, terminalibus, quam folia brevioribus; fructibus anguste ovoideis.

A tree about 15 m high, glabrous except the inflorescence. Branches brown, terete, glabrous, wrinkled when dry. Leaves alternate, up to 35 cm in length. Leaflets oblong, thickly coriaceous, prominently shining on both surfaces, the lower a little paler then the upper, 7 or 9 to each leaf, 8 to 13 cm long, 2.5 to 3.5 cm wide, entire, rather prominently acuminate, base acute, often somewhat inequilateral and sometimes rounded on one side and acute on the other; lateral nerves about 10, very

prominent on the lower surface, strongly curved, obscurely anastomosing near the margins, the reticulations not at all prominent; petiolules of the lateral leaflets 0.6 to 1.5 cm long, of the terminal one up to 4 cm in length. Panicles terminal, 13 cm long in fruit, brown-puberulent, branched from the base. Persistent calyces about 3 mm in diameter, puberulent. Immature fruits narrowly ovoid, somewhat inequilateral or somewhat gibbous, about 2 cm long, glabrous, not at all angled, the pericarp wrinkled when dry.

MINDANAO, District of Zamboanga, Taglibao River, *For. Bur. 13772 Foxworthy, DeMesa, & Villamil,* June 17, 1912, growing at sea level immediately back of the mangrove swamp, known to the Moros as *baúli.*

The species is apparently a rather characteristic one, and is perhaps as closely allied to *Canarium calophyllum* Perk., as to any other. It differs from *Canarium calophyllum,* however, in its fewer nerved leaves and in its much smaller persistent calyces.

CANARIUM STENOPHYLLUM sp. nov. § *Eucanarium, Monadelpha.*

Arbor alta partibus junioribus exceptis glabra; foliis circiter 20 cm longis, foliolis 13 ad 15, lanceolatis, integris, usque ad 11 cm longis, inaequilateralibus, leviter falcatis vel subrectis, basi acutis, apice longe acuminatis; racemis ♂ axillaribus, solitariis, 8 ad 10 cm longis; floribus circiter 1.3 cm longis, cylindraceis, filamentis deorsum connatis, disco libero.

A tree reaching a height of 40 meters, glabrous except the younger parts and the inflorescence. Branches terete, glabrous, lenticellate, grayish-brown, about 5 mm in diameter, the branchlets more or less appressed-villous or hirsute, especially the growing parts. Leaves alternate, about 20 cm long. Leaflets 13 to 15, lanceolate, inequilateral, straight or somewhat falcate, chartaceous, entire, 1 to 2.4 cm wide, 6 to 11 cm long, narrowed below to the acute or obtuse base, gradually narrowed upward to the long and rather slenderly acuminate apex, when dry olivaceous or subolivaceous, shining; lateral nerves about 9 on each side of the midrib, slender, curved, anastomosing; petiolules about 2 mm long; stipules not seen, if present very early deciduous. Male racemes axillary, solitary, 8 to 10 cm long, slightly pubescent, the flowers somewhat crowded in the upper one-half, white, their pedicels about 2 mm long. Calyx about 4 mm long, the lobes 3, broadly ovate, 2 mm long. Petals 3, oblong, imbricate, glabrous, about 13 mm long, 5 mm wide. Stamens 6, the filaments united below into a 2 mm high disk, the free parts 6 to 7 mm long; anthers oblong, 3 mm long. Disk free, oblong-cylindric, hirsute, somewhat fluted, about 4 mm long, 2.5 mm in diameter.

LUZON, Province of Camarines, Mount Isarog, *Phil. Pl. 1550 Ramos*, November 20, 1913, in forests.

This species is probably as closely allied to *Canarium perkinsiae* Merr. as to any other, differing in its much smaller, lanceolate leaves and in its short pedicels. It is well characterized by its narrowly lanceolate leaflets.

CANARIUM ELLIPSOIDEUM sp. nov. § *Eucanarium.*

Arbor alta, glabra (floribus ignotis); ramis incrassatis, glabris, circiter 2 cm diametro, brunneis, nitidis; foliis alternis, usque ad 55 cm longis, foliolis circiter 9-jugis, coriaceis, nitidis, ovatus ad oblongis, usque ad 16 cm longis, basi cordatis, apice distincte acuminatis; inflorescentiis ut videtur paniculatis, axillaribus, solitariis, infructescentibus 10 ad 30 cm longis; fructibus ellipsoideis, circiter 3 cm longis, utrinque rotundatis, laevis vel obscure rugosis, in siccitate castaneis, endocarpio longitudinaliter 6-carinato.

A tall tree, nearly glabrous, the ultimate branches much thickened, about 2 cm in diameter, dark-brown, shining, more or less striate or wrinkled when dry, marked with scattered large scars of fallen petioles, the very tip, above the ultimate leaves, densely ferruginous-pubescent. Leaves more or less crowded toward the ends of the branchlets, up to 55 cm long, each with about 19 leaflets, odd-pinnate, the rachis and petiole rather stout, shining, striate; stipules none or very early deciduous. Leaflets opposite, the lower ones ovate, 8 to 10 cm long, the intermediate and upper ones oblong, up to 16 cm long, 4 to 6 cm wide, shining on both surfaces, glabrous, rather pale when dry, the base prominently and broadly cordate, apex acuminate, the acumen blunt, rather stout; lateral nerves of the median leaflets about 16 on each side of the midrib, of the lower leaves about 10, distinct, anastomosing; petiolules stout, about 5 mm long. Flowers not seen. Infructescence axillary, solitary, 10 to 30 cm long, dark-brown, glabrous, shining, somewhat paniculate. Persistent calyx 3-lobed, very coriaceous, about 8 mm in diameter, slightly pubescent externally, inside densely appressed cinerous-pubescent, the lobes broadly ovate; pedicels stout, very short. Fruit ellipsoid, about 3 cm long, rounded at both ends, not at all 3-angled, the pericarp apparently fleshy, when dry castaneous, slightly wrinkled, glabrous, or the younger fruits with few, scattered, appressed, stiff, ferruginous hairs, the endocarp bony, 3-celled, only a single cell developing a seed, rounded at both ends, not at all 3-angled, but with three very prominent primary longitudinal keels or ridges that unite with each other at the base, and three intermediate keels or ridges,

nearly as prominent as the primary ones, which unite at the apex but are evanescent near the base.

LUZON, Province of Bulacan, Angat, *Bur. Sci. 21968 Ramos*, September 22, 1913, in forests.

A striking species on account of its thickened stems, its long leaves, and the almost entire absence of indumentum of any kind. The strictly ellipsoid, very dark-brown, shining, nearly smooth fruits are exceedingly characteristic, as is also the longitudinally 6-ridged endocarp, the fruit not being at all triangular.

CANARIUM SANCHEZII sp. nov. § *Monadelpha.*

Arbor, omnibus partibus, alabastris exceptis, glabra; foliis trifoliolatis, vix 20 cm longis, foliolis elliptico-ovatis, subcoriaceis, apice abrupte subcaudato-acuminatis; inflorescentiis axillaribus, spicatis, quam petioli brevioribus; floribus 3-meris, filamentis basi breviter connatis.

A tree, quite glabrous except the buds. Branches terete, light-gray, rather slender. Leaves 3-foliolate, 14 to 18 cm long, the petioles 2 to 3.5 cm long; leaflets elliptic-ovate, or the terminal one somewhat obovate-elliptic, subcoriaceous, somewhat shining, brown beneath when dry, the terminal ones up to 11 cm long and 5.5 cm wide, the lateral ones somewhat smaller, the base acute, the apex rather abruptly and slenderly subcaudate-acuminate, the acumen 1 cm long or less. Spikes axillary, solitary, 2.5 cm long or less, the bracteoles small, oblong-ovate, acute, 1 mm long or less. Calyx 2.5 mm long, 3-lobed, the lobes ovate, obtuse or subacute, about 1.5 mm long, pubescent externally. Petals 3, oblong, obtuse, glabrous, about 4 mm long, 2 mm wide. Stamens 6; filaments somewhat dilated below, united for the lower 0.5 mm, free from the disk; anthers about 1 mm long. Fruit unknown.

MINDANAO, Butuan Subprovince, Butuan, *J. F. Quadras 172*, from the herbarium of the Ateneo de Manila, locally known as *sauangan*.

Named in honor of Father F. Sanchez, for many years connected with the Museum of the Ateneo de Manila. A species well characterized by its trifoliolate leaves and short spikes.

GARUGA Roxb.

GARUGA LITTORALIS sp. nov.

Arbor 15 ad 20 m alta, inflorescentiis plus minusve dense cinereo-puberulis exceptis glabra vel subglabra; foliis 30 ad 45 cm longis, 9- vel 10-jugatis; foliolis oblongis, ovato-oblongis vel lanceolato-oblongis, acuminatis, basi late rotundatis, leviter cordatis, valde inaequilateralibus, integris, rariter distanter irregulariter leviter crenulatis; paniculis terminalibus, in anthesis

circiter 8 cm longis, dense cinereo-puberulis; pedicellis quam alabastra ovoidea brevioribus; petalis quam laciniae calyciniae duplo longioribus.

A tree 15 to 20 m high, nearly or quite glabrous except the rather densely cinereous-puberulent inflorescence. Branches reddish-brown, glabrous, lenticellate, much thickened, 1 to 1.5 cm in diameter. Leaves alternate, crowded at the apices of the branchlets, 30 to 45 cm long, deciduous before anthesis, the rachis often somewhat puberulent, becoming glabrous. Leaflets straight or somewhat falcate, 9 or 10 on each side of the rachis, opposite or nearly so, chartaceous or thinly coriaceous, oblong, ovate-oblong, or lanceolate-oblong, glabrous and somewhat shining when dry, of the same color on both surfaces, the lower ones usually smaller than the median ones, 5 to 12 cm long, 2 to 4.5 cm wide, the margins entire or rarely distantly and irregulary crenulate, the apex rather prominently acuminate, the base usually broad, rounded or sometimes subtruncate, usually somewhat cordate, strongly inequilateral, never with an additional pinnule at the base as in *Garuga floribunda* Dcne. Panicles appearing before the new leaves, terminal, usually many from the apices of the branchlets, about 8 cm long, all parts densely cinereous-puberulent. Flowers yellow, rather congested on the ultimate branchlets of the inflorescence, puberulent, their pedicels 1 to 1.5 mm long, shorter than the ovoid buds. Calyx 3 mm long, the lobes oblong-ovate, acute, 1.5 mm long. Petals puberulent, oblong-oblanceolate or narrowly oblong, usually acute, reflexed, about twice as long as the calyx-lobes. Filaments 2.5 mm long, pubescent, much thickened below; anthers 1 mm long. Ovary ovoid, sessile, pubescent, 2 mm long, 4-celled, each cell 2-ovuled, style stout, puberulent, 2.5 mm long; stigma obscurely 4-lobed. Fruit black when ripe, obovoid, much wrinkled when dry, glabrous, 8 to 10 mm in diameter, each containing one or two subglobose, prominently rugose seeds about 5 mm in diameter.

LUZON, Province of Tayabas, *For. Bur. 12342 Curran* (type), April, 1908, near the seashore. MASBATE, *For. Bur. 12572, 12587 Rosenbluth*, January, 1909, both specimens sterile. CEBU, Talisay, *For. Bur. 6431 Espinosa*, September, 1906. MINDORO, *For. Bur. 8705 Merritt*, January, 1908.

A tree, usually growing near the seashore, apparently rather widely distributed in the Philippines. It is manifestly allied to *Garuga floribunda* Dcne., of Timor and northern Australia, but appears to be distinguished from that species by its entire, much larger, leaflets, absence of the supplementary reduced pinnules at the base of the leaflets, and its short-pedicelled flowers. The inflorescence is not strictly terminal, but the peduncles are in the crowded axils of the fallen leaves at the apices

of the branchlets. The leaves appear after the flowers, and with the growth of the branchlet the panicles in fruiting stage become lateral, being situated in the axils of fallen leaves below the terminal crown of leaves.

The species is known in Tayabas as *libas* (Tagalog); in Masbate and Cebu as *bogo* (Visayan), and in Mindoro as *abilo* (Tagalog), the last name more usually applied to *Garuga abilo* (Blanco) Merr.

Var. **PAUCIJUGA** var. nov.

A typo differt foliis 5- vel 6-jugatis.

CAGAYAN DE SULU, *Merrill 5301*, October 15, 1906.

The specimen is in fruit, but in all essential characteris it appears to be like the species, differing only in its fewer leaflets. A specimen from Balabac Island, with flowers only, no leaves, may be referable here, *Bur. Sci. 398 Mangubat*, March, 1906, locally known as *baro*.

GARUGA CLARKII sp. nov.

Arbor circiter 30 m alta, subglabra; foliis alternis, usque ad 40 cm longis, imparipinnatis, 11- vel 12-jugatis, rhachibus plus minusve puberulis; foliolis inaequilateralibus, oblongo-lanceolatis, usque ad 10 cm longis, 3 cm latis distincte acuminatis, basi oblique rotundatis, margine distincte regulariterque crenato-dentatis; floribus ignotis; paniculis sub fructu axillaribus, pedunculatis, leviter puberulis, circiter 16 cm longis; fructibus obovoideis, nigris, circiter 1 cm diametro.

A tree about 30 m high, subglabrous, or somewhat gray-puberulent. Branches reddish-brown, glabrous, about 5 mm in diameter. Leaves crowded at the apices of the branchlets, 35 to 40 cm long, the rachis usually black when dry, somewhat puberulent. Leaflets opposite or subopposite, lanceolate or oblong-lanceolate, chartaceous, straight or slightly falcate, the median ones 8 to 10 cm long, 2.5 to 3 cm wide, the upper and lower ones somewhat smaller, the base strongly inequilateral, rounded on one side of the midrib, acute on the other, the apex prominently acuminate, the acumen about 1 cm long, blunt, the margins distinctly and regularly crenate-dentate, the upper surface quite glabrous, shining, the lower very slightly paler, glabrous or with few soft hairs; nerves about 13 on each side of the midrib, distinct; petiolules about 2 mm long, usually puberulent. Flowers unknown. Fruiting panicles axillary, peduncled, about 16 cm long, gray-puberulent. Fruits black and wrinkled when dry, obovoid, glabrous, 1 cm in diameter or less, each containing one or two rugose, subglobose seeds.

MASBATE, *For. Bur. 1700 Clark*, July 23, 1904, in forests at an altitude of about 150 m, on moderate slopes, locally known as *bugo* (Visayan), and said to yield a valuable timber.

This species is manifestly allied to the preceding one, but differs in its longer leaves and more numerous leaflets which are regularly crenate-dentate and although rounded, are never cordate at the base.

PROTIUM Burman

PROTIUM CONNARIFOLIUM (Perk.) comb. nov.

Canarium connarifolium Perk. Frag. Fl. Philip. (1904) 92.

This species, of which Dr. Perkins had no fruiting material, and of which she described only the male flowers is shown to be a representative of the genus *Protium* by additional material. It is not closely allied to *Protium javanicum* Burm., from which it differs in vegetative characters and its very short inflorescence. The fruits are apparently subglobose, when mature about 1.5 cm in diameter, ultimately 2- or 3-valved, and with 1 to 3 pyrenes, the pyrenes hard, about 8 mm long. It is further distinguished from *Canarium* by its 4-merous flowers. The species is represented by the following material, all from Palawan: *Merrill 787* (cotype), *Bur. Sci. 758, 754, 737, 866 Foxworthy, For. Bur. 21604 Agama*, from Iwahig, Alphonso XIII, and Mount Victoria, flowering February to May.

The genus is new to the Philippines.

SANTIRIA Blume

SANTIRIA CAUDATA sp. nov. § *Eusantiria*.

Arbor glaberrima circiter 15 m alta; foliis 25 ad 35 cm longis, foliolis 7, chartaceis vel subcoriaceis, in siccitate pallidis, nitidis, oblongo-ellipticis ad oblongo-lanceolatis, usque ad 18 cm longis, apice tenuiter caudato-acuminatis, basi acutis, nervis utrinque 12 ad 14, subtus prominentibus; paniculis axillaribus, 10 ad 15 cm longis, e basi ramosis; floribus 3 mm diametro.

A tree about 15 m high, entirely glabrous. Branches terete, light-gray, somewhat striate when dry. Leaves 25 to 35 cm long, the leaflets 7, oblong-elliptic to oblong-lanceolate, 12 to 18 cm long, 3.5 to 6 cm wide, chartaceous or subcoriaceous, pale and shining when dry, entire, the apex slenderly caudate-acuminate, acumen blunt, 1.5 to 2.5 cm long, the base acute, equilateral or nearly so; lateral nerves 12 to 14 on each side of the midrib, prominent, anastomosing, the reticulations lax, rather distinct; petiolules 1 to 2 cm long. Panicles axillary, pyramidal, up to 15 cm long, branched at or from near the base, the branches few, spreading, the lower ones 5 to 7 cm long. Flowers about 3 mm in diameter, greenish-yellow, their pedicels 2 to 3 mm long. Calyx shallow, 2.5 mm in diameter, the lobes rounded, about 1 mm long, 2 to 2.5 mm wide. Petals 3, broadly ovate, 2.5 mm wide and about 2.2 mm long, acute or obtuse, glabrous. Disk annular, thick, glabrous, obscurely undulate; stamens 6, the filaments broadened below, 0.5 mm long, attached to the outer part of the disk; anthers 0.5 mm long. Ovary ovoid, glabrous,

1.5 mm in diameter; style very short, stout; stigma depressed-globose or subdisciform.

LUZON, Province of Camarines, Tamban River, *For. Bur. 21211* (type), *21217 Alvarez*, April 1, 1914, forested slopes along streams, altitude 20 to 100 meters.

A species apparently belonging in the group with *Santiria beccarii* Engl., but well characterized by being entirely glabrous. It is probably most closely allied to the Philippine *S. glabra* Merr., from which it is readily distinguished by its larger, more numerously nerved, caudate-acuminate leaves and its longer panicles.

SANTIRIA LAGUNENSIS sp. nov. § *Eusantiria* ?

Arbor alta partibus junioribus inflorescentiisque leviter furfuraceis exceptis glabra; foliis usque ad 20 cm longis, foliolis 5 vel 6, oblongo-ovatis, integris, in siccitate pallidis, nitidis, usque ad 11 cm longis, subcoriaceis, acuminatis, basi acutis ad rotundatis, nervis utrinque circiter 8; paniculis axillaribus, usque ad 7 cm longis, leviter ferrugineo-furfuraceis, e basi ramosis.

A tree, apparently tall, glabrous except the rather densely ferruginous-furfuraceous tips of the branchlets and the slightly furfuraceous inflorescence. Branches pale-gray, terete, somewhat striate, glabrous, the tips somewhat brownish. Leaves about 20 cm long, the leaflets usually 6, sometimes 5, oblong-ovate, subcoriaceous, pale and shining when dry, 8 to 11 cm long, 2.5 to 5 cm wide, entire, apex narrowed, rather prominently acuminate, base acute to rounded; lateral nerves about 8 on each side of the midrib, slender but distinct, anastomosing, the reticulations lax; petiolules 7 to 10 mm long. Panicles axillary, about 7 cm long, branched at or from near the base, the branches few, the lower ones up to 2 cm long, the younger parts distinctly but minutely ferruginous-furfuraceous. Flowers 3-merous, the young buds globose, rather numerous. Young fruits globose, black when dry, 8 mm in diameter, the stigma lateral.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 20505 Ramos*, February, 1913, forested slopes.

Somewhat resembling *Santiria nitida* Merr., but the inflorescence entirely different. The species is characterized by its minutely furfuraceous, more or less ferruginous indumentum on the growing tips of the branchlets and on the inflorescence, otherwise quite glabrous.

SANTIRIA SAMARENSIS sp. nov. § *Eusantiria*.

Arbor 20 ad 30 m alta ramulis inflorescentiisque exceptis glabra; ramulis crassis, in siccitate brunneis, partibus junioribus plus minusve breviter ferrugineo-pubescentibus; foliis usque ad 80 cm longis, foliolis 9 vel 11, coriaceis, nitidis, oblongis ad oblongo-ellipticis, usque ad 20 cm longis, basi acutis ad subro-

tundatis, leviter inaequilateralibus, spice caudato-acuminatis, nervis utrinque 12 ad 15, subtus prominentibus; paniculis axillaribus, 30 ad 40 cm longis, amplis, multifloris, ab infima tertia parte ramosis; floribus pubescentibus, circiter 6 mm longis.

A tree 20 to 30 m high, glabrous except the branchlets and inflorescence. Branchlets thickened, reddish-brown or brown when dry, about 1 cm in diameter, terete, lenticellate, the younger parts more or less ferruginous-pubescent with short hairs. Leaves alternate, up to 80 cm in length, the rachis and petioles reddish-brown when dry; leaflets 9 or 11, coriaceous, rather pale when dry, somewhat shining, oblong to oblong-elliptic, entire, 12 to 20 cm long, 5 to 9 cm wide, the base acute to subrounded, somewhat inequilateral, the apex slenderly and rather abruptly caudate-acuminate, the acumen up to 2.5 cm long, blunt; lateral nerves 12 to 15 on each side of the midrib, very prominent on the lower surface, curved-anastomosing, the reticulations distinct; petiolules 2 to 3 cm long, reddish-brown when dry. Panicles axillary, solitary, many on each branchlet, 30 to 40 cm long, the lower one-third without branches, the primary branches spreading or ascending, the lower ones up to 10 cm in length, sparingly pubescent, reddish-brown, the ultimate branchlets and pedicels rather densely pale-ferrugineous pubescent with short hairs. Flowers yellowish, about 6 mm long, the pedicels 3 to 4 mm long, the bracts lanceolate, acuminate, deciduous, about 3 mm long. Male flowers: Calyx somewhat cup-shaped, pubescent, about 3 mm long and wide, with 3 broadly triangular-ovate, acute teeth about 1 mm long. Petals 3, free, pubescent on both surfaces, coriaceous, broadly ovate, obtuse, 4 to 4.5 mm long. Disk prominent, thickened, annular, glabrous, about 3 mm in diameter. Stamens 6; filaments attached to the outer margin of the disk, flattened below, narrowed above, about 1.5 mm long; anthers oblong, dorsifixed, 1 to 1.2 mm long. Rudimentary ovary very small, glabrous. Female flowers in general similar to the males. Staminodes 1.5 mm long. Ovary ovoid, glabrous, 3-celled; stigma capitate, sessile, about 1 mm in diameter.

SAMAR, Mount Cauayan, *Phil. Pl. 1641 Ramos* (type), April, 1914, distributed sub *Canarium*. LUZON, Province of Camarines, Mount Balu, *For. Bur. 21136 Miranda*, April, 1914; Tarangtong, *For. Bur. 21098 Abellanosa*, March 31, 1914, in forests, altitude about 160 meters, Bicol name *palaspas*.

A species belonging in the same group with *Santiria laevigata* Bl. and *S. maingayi* Benn., characterized among the few Philippine forms by its large leaflets which are prominently caudate-acuminate, and by its elongated, many flowered panicles.

ANACARDIACEAE

DRACONTOMELUM Blume

DRACONTOMELUM EDULE sp. nov.

Arbor alta, ramis incrassatis, ramulis junioribus dense ferrugineo-puberulis; foliis circiter 40 cm longis, rhachibus puberulis, foliolis alternis subtus, axillis barbatis exceptis, glabris, chartaceis oblongis, nitidis, acuminatis, 12 ad 17 cm longis, nervis utrinque circiter 12, prominentibus; fructibus globosis, carnosis, edulis, glabris, circiter 2.5 cm diametro, putamine depresso, 1.8 cm diametro.

A tree reaching a height of 20 m, similar and closely allied to *Dracontomelum cumingianum* Baill., differing especially in its glabrous leaflets. Branches thickened, terete, about 1 cm in diameter, grayish-brown, marked with large petiolar scars, the tips densely ferruginous-puberulent. Leaves crowded at the apices of the branchlets, about 40 cm long, the petiole and rachis somewhat cinereous-puberulent, becoming glabrous; leaflets about 11, chartaceous, oblong, entire, rather sharply acuminate, base acute to rounded, somewhat inequilateral, mostly 12 to 17 cm long, 4 to 5.5 cm wide, shining on both surfaces, the lower slightly paler than the upper, quite glabrous except for the bearded glands in the axils on the lower surface; lateral nerves about 12 on each side of the midrib, prominent, curved upward, distant from the margin, anastomosing, the reticulations distinct; petiolules about 2 mm long. Panicles in the upper axils, puberulent, flowers not seen. Fruit globose, green, turning yellowish when ripe, about 2.5 cm in diameter, glabrous, smooth, the mesocarp fleshy, acid, edible; stone depressed, about 1.8 cm in diameter, 8 mm high, obscurely undulate-ridged.

PALAWAN, Taytay, *Merrill 9391*, May 14, 1913, in forests immediately back of the mangrove and on steep slopes, ascending to at least 40 meters altitude.

A species manifestly closely allied to *Dracontomelum cumingianum* Baill., from which it differs in its leaflets being quite glabrous except for the bearded axils. It might be considered merely as a variety or form of Baillon's species by some authors.

BUCHANANIA Sprengel

BUCHANANIA PLATYPHYLLA sp. nov. § *Sagittatae*.

Arbor 10 ad 20 m alta, ramulis junioribus inflorescentiisque parce adpresse ferrugineo-hirsutis; foliis coriaceis, oblongis, nitidis, usque ad 35 cm longis, apice breviter, abrupte, obtuseque acuminatis, basi cuneatis vel leviter decurrento-acuminatis, nervis utrinque circiter 20; paniculis circiter 20 cm longis,

multifloris, floribus 5-meris; fructibus parcissime hirsutis vel vetustioribus glabris, apiculo centrico.

A tree 10 to 20 m high, the growing tips of the branchlets rather densely appressed ferruginous-hirsute. Branches terete, brown, glabrous. Leaves oblong, coriaceous, somewhat shining, 20 to 35 cm long, 8 to 12 cm wide, pale or brownish-olivaceous when dry, of about the same color on both surfaces, the apex shortly, abruptly, and obtusely acuminate, base narrowed in the lower one-fourth, cuneate or somewhat decurrent-acuminate; primary nerves 17 to 22 on each side of the midrib, prominent, the secondary nerves and reticulations netted, not parallel, distinct; petioles 1 to 2 cm long. Panicles numerous, in the upper axils, usually about 20 cm long, many-flowered, all parts with few, scattered, usually appressed, pale or ferruginous, hirsute hairs, in fruit sometimes becoming nearly or quite glabrous. Flowers 5-merous, white, the pedicels 1 mm long or less. Calyx-lobes oblong, obtuse, about 1 mm long. Petals oblong, obtuse, about 2.6 mm long, 1 mm wide, reflexed. Disk glabrous. Filaments about 1.3 mm long, much narrowed at the apex; anthers about 1 mm long, prominently sagittate. Carpels rather densely pubescent. Mature fruits red, orbicular to broadly obovoid, somewhat compressed, about 1 cm long, the apiculus central, when immature with few, scattered, pale or ferruginous hairs, in age glabrous or with very few hairs.

This species is widely distributed in the Philippines and is manifestly allied to the common *Buchanania arborescens* Blume, differing notably in its much larger, more numerously nerved leaves. The type is *For. Bur. 20274 Miranda*, from the Province of Misamis, Mindanao, March, 1913, and I refer here also the following specimens:

LUZON, Province of Cagayan, *For. Bur. 17154, 17303 Curran, For. Bur. 18459, 18468, 18431 Alvarez, For. Bur. 14767 Darling.* MINDANAO, District of Zamboanga, *For. Bur. 21894 Villamil, Williams 2363, 2879:* District of Cotabato, *For. Bur. 11772 Whitford.* BASILAN, *Bur. Sci. 16356 Reillo, For. Bur. 17896 Rafael, For. Bur. 3983 Hutchinson:* District of Lanao, *For. Bur. 22032 Sherfesee, Cenabre, & Ponce.* It is known in Cagayan Province, Luzon, as *paleng, arangas, sambrit,* and *pappagan;* in Mindanao as *manguian;* and in Basilan as *lingabunu.*

BUCHANANIA ACUMINATISSIMA sp. nov. § *Sagittatae.*

Arbor glabra circiter 10 m alta; foliis coriaceis, nitidis, in siccitate brunneis, oblongo-oblanceolatis, tenuiter acuminatis, usque ad 17 cm longis, longe petiolatis, basi longe anguste decurrento-acuminatis, nervis utrinque 20 ad 25; paniculis folia subaequantibus, glabris; floribus 4-meris, longe pedicellatis, pedicellis articulatis; carpellis glabris; antheris sagittatis.

A glabrous tree about 10 m high, or the very tips of the

growing branchlets somewhat pubescent. Branches terete, dark reddish-brown. Leaves brown when dry, shining, coriaceous, oblong-oblanceolate 15 to 17 cm long, 3 to 4 cm wide, the apex slenderly subcaudate acuminate, the acumen up to 2 cm long, blunt, the base narrowed, long and slenderly decurrent-acuminate; lateral nerves 20 to 25 on each side of the midrib, slender, distinct on both surfaces, the secondary veins not parallel, reticulations distinct; petioles 3 to 3.5 cm long. Panicles quite glabrous, slender, rather few-flowered, about as long as the leaves, branched from the middle and above. Flowers white, 4-merous, their pedicels somewhat 4-angled, distinctly jointed, gradually thickened upward, 2 to 3 mm long. Calyx lobes 0.5 mm long or less. Petals oblong, obtuse, 2.5 mm long, about 1 mm wide. Filaments 1 mm long, the apical part very slender; anthers sagittate, about 1 mm long. Disk and carpels glabrous.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 10932 Ramos*, August, 1910, in forests, Dahican River.

A species similar to *Buchanania sessilifolia* Blume (*B. acuminata* Turcz.), from which it differs in its much more numerous lateral nerves, and entirely glabrous leaves and panicles. The material was distributed as *Buchanania arborescens* Blume, but it is quite different from that species and not closely allied to it.

BUCHANANIA RETICULATA Elm. Leafl. Philip. Bot. 4 (1912) 1499.

This is typical *Mangifera altissima* Blanco, and must be reduced to Blanco's species. The type is *Elmer 12334* from the Island of Sibuyan.

PRUNUS ? LAURIFOLIA Dcne. in Nouv. Ann. Mus. Paris 3 (1834) 458; Miq. Fl. Ind. Bat. 1^1 (1855) 366=*Buchanania arborescens* Blume.

This species was considered by Miquel as a true *Prunus*, but he manifestly saw no specimens. A cotype of the species, received from the Museum of Natural History, Paris, is in the Herbarium of the Bureau of Science. The specimen is with fruits, and is typical *Buchanania arborescens* Blume.

SWINTONIA Griffith

SWINTONIA ACUMINATA sp. nov.

Arbor glabra, 15 ad 20 m alta; foliis coriaceis vel subcoriaceis, usque ad 15 cm longis, oblongo-ellipticis, utrinque subaequaliter angustatis, apice acuminatis, basi leviter decurrentibus, subtus pallidis, nervis utrinque circiter 15; paniculis folia aequantibus vel longioribus, multifloris, pedicellis glabris vel minute pubescentibus, petalis intus puberulis, sub anthesin circiter 2.5 mm longis, obtusis, elliptico-ovatis.

A tree 15 to 20 m high, entirely glabrous except the short pedicels and slightly puberulent petals. Branches terete, dark reddish-brown when dry. Leaves alternate, coriaceous or sub-

coriaceous, oblong-elliptic, 8 to 15 cm long, 3 to 6 cm wide, pale and shining when dry, the lower surface somewhat glaucous, subequally narrowed to the acuminate apex and to the acute or acuminate and very slightly decurrent base, the acumen up to 1 cm in length, blunt; lateral nerves about 15 on each side of the midrib, mostly spreading, slightly curved, prominent, the reticulations distinct on both surfaces; petioles slender, semiterete, not sulcate, reddish-brown when dry, 4 to 5 cm long. Panicles axillary, slender, numerous, many flowered, up to 20 cm in length, the lower branches up to 12 cm in length. Flowers cream-color or white, numerous, somewhat crowded on the ultimate short branchlets, the pedicels 2 mm long or less. Calyx campanulate, about 2 mm long, the lobes broad, rounded, imbricate. Petals in anthesis elliptic-ovate, obtuse, about 2.5 mm long, glabrous outside, somewhat puberulent inside. Stamens 5. Ovary ovoid, glabrous, inequilateral, about 1 mm long; style short; stigma capitate.

LUZON, Province of Camarines, Pinamuhagan, *For. Bur. 21749 Fischer* (type), April 16, 1914; same province and month of collection, *For. Bur. 21729 Peñas, Soriano, & Abellanosa, For. Bur. 21232 Alvarez.* In forests, altitude 10 to 80 meters.

Apparently allied to the Bornean *Swintonia glauca* Engl., but the branchlets entirely glabrous, leaves not dark-colored on the upper surface when dry, and with more prominent and more numerous lateral nerves, relatively shorter and glabrous panicles, and glabrous ovaries. It is quite different from the other known Philippine species.

SABIACEAE

MELIOSMA Blume

MELIOSMA ACUMINATISSIMA sp. nov.

Arbor circiter 5 m alta, glabra vel subglabra; foliis pinnatis, usque ad 50 cm longis, foliolis subcoriaceis, usque ad 13, oblongo-ovatis ad lanceolatis, tenuiter acute acuminatis, basi acutis, margine integris, usque ad 11 cm longis, nitidis, nervis utrinque 6 vel 7; infructescentibus folia aequantibus, terminalibus, fructibus obovoideis, circiter 6 mm diametro, leviter compressis, obscure reticulatis.

A tree about 5 m high, glabrous or nearly so. Branches terete, pale brownish, the very tips ferruginous-hirsute, the plant (in fruit) otherwise glabrous. Leaves up to 50 cm long, pinnate, the leaflets about 13, oblong-ovate to lanceolate, entire, subcoriaceous, pale-olivaceous, shining, 7 to 11 cm long, 3 to 4 cm wide, apex rather slenderly and sharply acuminate, base acute, often a little inequilateral; lateral nerves about 6 on each side of the midrib, prominent, curved-ascending, prominently anas-

tomosing; petiolules about 4 mm long. Panicles (in fruit) terminal, glabrous, as long as the leaves, the fruits nearly black when dry, obovoid, about 6 mm in diameter, slightly compressed, obscurely reticulate.

LUZON, Province of Tayabas, Mount Pular, *Bur. Sci. 19417 Escritor*, January, 1913, in forests near the summit of the mountain.

A species well distinguished by being glabrous or nearly so, and by its entire leaflets. It is probably most closely allied to *Meliosma sylvatica* Elm., but that species is prominently pubescent and has denticulate leaflets.

MELIOSMA MACGREGORII sp. nov.

Arbor erecta vel scandens (?) prominente ferrugineo-hirsutis; foliis pinnatis, usque ad 40 cm longis, foliolis 9, oblongis ad oblongo-oblanceolatis, coriaceis, usque ad 12 cm longis, acuminatis, basi acutis, nervis utrinque circiter 10, subtus valde prominentibus, margine integris ad leviter distanter denticulatis; paniculis terminalibus, amplis, multifloris, folia subaequantibus; floribus racemose dispositis, circiter 3 mm longis.

An erect tree of small size (or scandent ?), the branches, inflorescence, petioles and rachis, and the leaflets beneath and on the midrib and lateral nerves on the upper surface prominently ferruginous-hirsute. Leaves pinnate, up to 40 cm long, the leaflets 9, coriaceous, oblong to oblong-oblanceolate, 7 to 12 cm long, 2.5 to 4 cm wide, the apex sharply acuminate, base acute, margins entire to distantly and irregularly denticulate, the upper surface grayish to brownish when dry, somewhat shining, the midrib, nerves, and primary reticulations more or less impressed, the former two ferruginous-hirsute, the lower surface brown, paler than the upper surface, prominently hirsute on the midrib and lateral nerves, with few hairs on the reticulations; lateral nerves about 10 on each side of the midrib, very prominent, curved-anastomosing, the reticulations prominent; petiolules 6 to 10 mm long and with the rachis and petioles prominently ferruginous-hirsute. Panicles terminal, about as long as the leaves, prominently ferruginous-hirsute, the primary branches distant, spreading, up to 16 cm long, the lower secondary ones of each branch up to 7 cm long, many flowered, the flowers white, racemosely disposed on the ultimate branchlets, not crowded, their pedicels 1 mm long or less, the bracts and bracteoles oblong, pubescent, 1 to 2 mm long. Sepals ovate to elliptic-ovate, about 1.8 mm long, margins ciliate. Outer three petals orbicular-ovate, rounded, 2.5 to 3 mm long, the inner two reduced to a bifid membranaceous scale about 1 mm long, cleft into two oblong lobes. Stamens about 1.8 mm long, the

imperfect ones membranaceous, retuse, oblong, about 0.8 mm long. Ovary ovoid, glabrous. Fruit ovoid, slightly compressed, black, about 7 mm in diameter.

LUZON, Ifugao Subprovince, Mount Polis, *Bur. Sci. 19749 McGregor*, February, 1913, in flower (type): Lepanto Subprovince, Mount Data, *Merrill 4600*, November, 1905, in fruit, distributed as *M. pendula*.

A species manifestly allied to *Meliosma pendula* Merr., from which it differs in its much narrower, very differently shaped leaflets.

MELIOSMA LOHERI sp. nov.

Arbor parva circiter 5 m alta partibus junioribus inflorescentiisque dense ferrugineo-pubescentibus; foliis simplicibus, anguste oblongo-obovatis ad oblongo-oblanceolatis, coriaceis, usque ad 20 cm longis, acuminatis, basi angustatis, cuneatis, margine sursum irregulariter grosse serratis, nervis utrinque circiter 15, subtus valde prominentibus; inflorescentiis terminalibus, paniculatis, folia subaequantibus, multifloris; floribus plus minusve confertis, brevissime pedicellatis, circiter 2.5 mm longis.

A small tree, about 5 m high according to Vanoverbergh, the younger parts and inflorescence densely ferruginous-pubescent. Branches terete, dark-brown, pubescent, the younger parts very densely so. Leaves simple, coriaceous, narrowly oblong-obovate to oblong-oblanceolate, 10 to 20 cm long, 3 to 6 cm wide, apex prominently acuminate, acumen apiculate, base gradually narrowed, cuneate, margins in the lower part entire, in the upper one-half usually with few, irregular, rather coarse, sharp teeth, the upper surface olivaceous, glabrous, shining, the ultimate reticulations distinct, minute, subfoveolate, the lower surface more or less pubescent, somewhat paler than the upper, the nerves and reticulations very distinct; lateral nerves about 15 on each side of the midrib, prominent, anastomosing, the primary reticulations very prominent; petioles 2 to 3.5 cm long, pubescent. Panicles terminal, about as long as the leaves, ferruginous-pubescent, many-flowered, the flowers white, rather crowded on the ultimate branchlets, their pedicels very short, the bracts pubescent, oblong-lanceolate, acuminate, about 1.2 mm long. Sepals ovate, rather thin, obtuse, about 1.2 mm long, pubescent. Outer three petals orbicular-ovate, rounded, about 2.5 mm long, the inner two adnate to the filaments, 1 mm long or less, cleft nearly to the base into two linear-oblong lobes. Filaments about 1 mm long, the anthers 1 mm wide, one-half as long; imperfect stamens strongly incurved, channeled, retuse, broadly ovate. Ovary compressed, glabrous, ovoid, about 1 mm long.

LUZON, Bontoc Subprovince, Malamey, *Vanoverbergh 1131* (type), March 7, 1914, in forests, altitude about 1,600 meters; Ifugao Subprov-

ince, Mount Polis, *Bur. Sci. 19630 McGregor*, February, 1913. Here probably should be referred *Loher 268* (herb. Kew.) from Atoc, Benguet Subprovince, a mere fragment of which is in the Herbarium of the Bureau of Science.

Closely allied to *Meliosma monophylla* Merr. of central Luzon, but at once distinguishable by its fewer nerved leaves, about 15 pairs in the present species, about 20 pairs in *M. monophylla*.

MELIOSMA PAUCINERVIA sp. nov.

Arbor, partibus junioribus inflorescentiisque plus minusve ferrugineo-hirsutis; foliis pinnatis, usque ad 35 cm longis, foliolis 7 vel 8, subcoriaceis, oblongis, acute acuminatis, basi acutis ad subrotundatis, usque ad 12 cm longis, nitidis, margine distanter apiculato-serratis, nervis utrinque 4 vel 5, prominente anastomosantibus; paniculis terminalibus, laxis, circiter 25 cm longis; floribus circiter 3 mm longis; ovario hirsuto.

A tree, size not indicated, the younger parts and inflorescence more or less ferruginous-hirsute. Branches reddish-brown when dry, nearly glabrous, the younger ones sparingly hirsute. Leaves pinnate, up to 35 cm in length, the rachis reddish-brown, sparingly hirsute, leaflets 7 or 8, 8 to 12 cm long, 3 to 4.5 cm wide, subcoriaceous, oblong, sharply acuminate, base acute to somewhat rounded, margins of the larger leaflets with from 4 to 6, distant, small, apiculate, serrate teeth, the upper surface olivaceous when dry, shining, glabrous or the midrib sparingly hirsute, the lower surface paler, sparingly hirsute on the midrib and lateral nerves which are brown in contrast to the paler surface; lateral nerves 4 or 5 on each side of the midrib, very prominent, curved, prominently anastomosing, the reticulations lax; petiolules sparingly hirsute, 5 mm long or less. Panicles terminal, ample, lax, up to 25 cm in length, rather prominently ferruginous-hirsute, the branches distant, the lower ones up to 16 cm long, spreading or curved-ascending. Flowers white, racemosely and laxly disposed on the ultimate branchlets, their pedicels hirsute, 1 to 2 mm long, the bracts oblong-lanceolate, acuminate, about 2 mm long. Sepals pubescent, oblong to ovate, about 2 mm long. Outer three petals orbicular-ovate, rounded, about 3 mm in diameter, with a short ligulelike appendage near the apex inside; two inner petals reduced to mere rudiments, each consisting of two, narrowly linear lobes about 1.2 mm long, adnate to the stamens. Fertile stamens 1.5 mm long, the imperfect ones broad, incurved, oblong-ovate, about 1.5 mm long (spread) and 1 mm wide. Ovary ovoid, hirsute.

MINDANAO, District of Zamboanga, Santa Maria, *Bur. Sci. 16436 Reillo*, October, 1912.

A species well characterized by its distantly and sharply toothed leaflets, few but prominent and prominently anastomosing lateral nerves, lax panicles with laxly arranged flowers, and hirsute ovaries.

RHAMNACEAE

VENTILAGO Gaertner

VENTILAGO LANCEOLATA sp. nov.

Frutex scandens, partibus junioribus exceptis glaber; ramulis tenuibus, teretibus; foliis lanceolatis, chartaceis, integris, usque ad 8 cm longis, brevissime petiolatis, sursum angustatis, obtusis, basi subacutis ad subrotundatis, nervis utrinque circiter 9, tenuibus; racemis axillaribus, tenuibus, sub fructu usque ad 6 cm longis, solitariis; fructibus 4 ad 5 cm longis.

A scandent shrub, glabrous except the younger parts. Branches slender, terete, the branchlets glabrous or slightly and obscurely pubescent. Leaves lanceolate, chartaceous, 5 to 8 cm long, 1 to 2.5 cm wide, rather pale when dry, shining on both surfaces, entire, gradually narrowed upward to the obtuse apex, the base subacute to subobtuse; lateral nerves about 9 on each side of the midrib, very slender, curved-ascending, obscurely anastomosing very close to the margins, the reticulations fine, close, evident on both surfaces; petioles glabrous, 2 mm long or less. Racemes axillary, solitary, slender, in fruit up to 6 cm long, slightly pubescent. Fruits, including the wing, 4 to 5 cm long, the basal part nearly 5 mm in diameter, quite glabrous, the wing 7.5 to 10 mm wide, reticulate, somewhat rounded at the apex, shortly apiculate.

BILIRAN, *Bur. Sci. 18646 McGregor*, June 14, 1914, in thickets near the seashore.

A species characterized by its lanceolate, slenderly nerved leaves, and its inflorescence reduced to a simple axillary raceme.

ZIZYPHUS Linnaeus

ZIZYPHUS OTANESII sp. nov.

Arbor circiter 5 m alta, ramulis pubescentibus, spinosis; foliis parvis, suboblique ellipticis vel elliptico-ovatis, chartaceis, usque ad 3 cm longis, obtusis, 3-nerviis, subtus parce pubescentibus; fructibus globosis, glabris, 1.5 cm diametro.

A tree about 5 m high, the branches terete, reddish-brown, glabrous, the branchlets with very short sharp spines at the nodes 1 to 2 mm in length, the younger branchlets ferruginous-pubescent. Leaves small, somewhat inequilateral, chartaceous, 1.5 to 3 cm long, 1 to 2 cm wide, obtuse, base rounded or subacute on one side and rounded on the other, 3-nerved, the upper surface olivaceous, glabrous or slightly pubescent on the nerves,

the lower surface slightly paler, sparingly appressed-pubescent, the hairs on the nerves somewhat ferruginous; petioles ferruginous-pubescent, 2 to 3 mm long. Fruits globose, hard, glabrous, smooth, about 1.5 cm in diameter.

LUZON, Province of Pangasinan, Umingan, *Bur. Sci. 17964 Otanes*, April 16, 1914, in forests east of the town, known to the Ilocanos as *dilap*.

Manifestly allied to *Zizyphus trinervia* Poir., but at once distinguished by its much smaller, but slightly pubescent leaves.

ELAEOCARPACEAE

ELAEOCARPUS Linnaeus

ELAEOCARPUS BATAANENSIS sp. nov. § *Dicera*.

Arbor circiter 12 m alta, novellis inflorescentiisque parcissime pilosis exceptis glabra; foliis oblongo-ellipticis, chartaceis, usque ad 9 cm longis, basi acutis, apice acuminatis, nitidis, subtus eglandulosis, nervis utrinque circiter 6, tenuibus; racemis axillaribus, 3 ad 4 cm longis, paucifloris; floribus 5-meris, sepalis lanceolatis, acuminatis, circiter 5 mm longis, petalis laciniatis, basi cuneatis, margine dense villosis; staminibus 25, antheris apice ciliatis; fructibus 1-locellatis, ellipsoideis, circiter 2.5 cm longis.

A tree about 12 m high, quite glabrous except the slightly appressed-pilose younger branchlets and inflorescence. Branches slender, reddish-brown. Leaves oblong-elliptic, chartaceous, 6 to 9 cm long, 2 to 3.5 cm wide, subequally narrowed to the acute base and the somewhat acuminate apex, margins serrate-crenulate, somewhat olivaceous when dry, shining; lateral nerves slender, about 6 on each side of the midrib, anastomosing, the reticulations slender, axils of the leaves eglandular; petioles slender, 1 to 1.5 cm long. Racemes axillary, solitary, few, 3 to 4 cm long, few-flowered, the pedicels about 5 mm long. Flowers white, 5-merous. Sepals lanceolate, acuminate, about 5 mm long, 1.2 mm wide, externally very slightly puberulent. Petals 5.5 to 6 mm long, base cuneate, margins in the lower part densely villous with long hairs, the apical 2 mm cut into about 15, very slender, subequal divisions. Stamens about 25, 3 mm long, the anthers narrow, scabrid, cleft at the apex, one cell very slightly exceeding the other and ciliate-bearded at the tip. Ovary pubescent; style slender, lower part somewhat pubescent. Fruit ellipsoid or narrowly ellipsoid, about 2.5 cm long, 1.5 cm in diameter, rounded at both ends, the endocarp hard, bony, 1-celled.

LUZON, Province of Bataan, forests back of Limay, *For. Bur. 21908 Medina*, July 2, 1914, on forested slopes, altitude about 300 meters.

This species is characterized by its few flowers, equally and slenderly divided petals which are densely villous on the margins of the lower one-half, and its eglandular leaves. It is an ally of *Elaeocarpus isotrichus* F.-Vill., but has much smaller, quite different leaves.

ELAEOCARPUS OLIGANTHUS sp. nov. § *Dicera*.

Arbor parva, plus minusve pubescens; foliis oblongis, chartaceis, usque ad 8 cm longis, basi acutis, apice acuminatis, margine leviter crenatis, dentibus tenuiter aristatis, nervis utrinque 5 vel 6; racemis, axillaribus, solitariis, paucifloris; floribus 5-meris, 5 mm longis, petalis obovatis, ½ laciniatis, laciniis 12, tenuibus, intus dense hirsutis; staminibus 15; ovario 2-loculare, dense villoso; fructibus 2.5 cm longis, vix 1 cm diametro, utrinque angustatis, acutis.

A tree about 8 m high, the branchlets, petioles, lower surfaces of the leaves on the midribs, and inflorescence rather densely pubescent. Branches terete, reddish-brown, glabrous, smooth, very slightly lenticellate. Leaves oblong to broadly oblong-lanceolate, 5 to 8 cm long, 1.8 to 3 cm wide, the base acute, the apex acuminate, the margins crenulate, each tooth tipped with a short, slender, awn or mucro, the upper surface shining, the lower a little paler, chartaceous; lateral nerves 5 or 6 on each side of the midrib, slender; petioles 3 to 4 mm long. Racemes axillary, solitary, few-flowered, pubescent, 4 to 5 cm long. Flowers 5-merous, their pedicels slender, about 8 mm long, pubescent. Sepals lanceolate, acute, 5 mm long, 1.5 mm wide, slightly pubescent externally, margins densely puberulent, inside glabrous. Petals obovate in outline, 4 mm long, cut one-half to the base into 12, slender, subequal, segments, the lower one-half inside densely hirsute, margins hirsute, back glabrous except near the base. Stamens 15, the anthers narrowly oblong, 2 mm long, minutely scabrid, one cell slightly longer than the other and shortly ciliate at the apex, both obtuse; filaments 0.5 mm long or less. Ovary densely villous, 2-celled, narrowed upward to the style, densely pale-villous; disk-glands prominent, pubescent. Fruit narrowly oblong, about equally narrowed and acute at both ends, smooth, about 2.5 mm long, 0.8 mm in diameter.

MINDANAO, District of Zamboanga, Siay River, *For. Bur. 13398 Foxworthy, DeMesa, & Villamil*, May 29, 1912, along the river, near sea level.

A species characterized by its pubescence, its rather small leaves, its few-flowered racemes, and its petal-characters. It somewhat resembles and probably is closely allied to *Elaeocarpus villosiusculus* Warb., from which, however, it differs in many characters.

ELAEOCARPUS RAMIFLORUS sp. nov. § *Ganitrus.*

Arbor alta partibus junioribus inflorescentiisque leviter puberulis vel pubescentibus, vetustioribus glabris; foliis lanceolatis, membranaceis vel chartaceis, usque ad 12 cm longis, nitidis, leviter acuminatis, basi acutis, margine obscure crenulatis; racemis numerosis, e axillis defoliatis, circiter 6 cm longis; floribus 5-meris, 6 mm longis, ovario 5-loculare.

A tall tree, nearly glabrous except the younger parts and the inflorescence. Branches terete, dark-colored when dry, glabrous, the growing parts slightly gray-puberulent. Leaves lanceolate, membranaceous or somewhat chartaceous, 9 to 12 cm long, 2 to 3.5 cm wide, subequally narrowed at both ends, the upper surface shining and olivaceous when dry, the lower a little paler and when young a little pubescent along the midrib, becoming quite glabrous, smooth, the apex acuminate, base acute, margins obscurely crenulate; lateral nerves about 12 on each side of the midrib, slender, rather distinct, usually with glands in the axils; petioles 1 to 1.5 cm long, somewhat appressed-pubescent. Racemes numerous, about 6 cm long, from the branches below the leaves in the axils of fallen leaves, one raceme from each axil, distinctly pubescent with appressed grayish hairs. Pedicels about 6 mm long, appressed-pubescent. Sepals lanceolate, somewhat acuminate, 4.5 to 5 mm long, externally sparingly appressed-pubescent with grayish hairs, internally slightly puberulent, the margins rather densely so. Petals 5 to 6 mm long, cut one-half way to the base into 9 to 11 slender segments, margins rather prominently pubescent in the lower one-half, the back slightly pubescent in the median part, otherwise glabrous. Stamens many; filaments very short, hispid; anthers linear-oblong, about 2 mm long, minutely hispid, one cell slightly longer than the other and with a tuft of few short cilia at the apex. Ovary globose, villous, 5-celled; style slightly pubescent, 2 mm long. Fruits not seen.

LUZON, Province of Laguna, San Antonio, trail between San Antonio and Piape, in forests, *Bur. Sci. 13115 Ramos*, June, 1912.

One of the very few species of the section at present known from the Philippines, characterized by its lanceolate shining leaves and its numerous racemes which are borne on the ultimate branches but entirely below the leaves.

ELAEOCARPUS CALOMALA (Blanco) comb. nov.

Vallea calomala Blanco Fl. Filip. (1837) 439.

Ageracium (*Ageratium*) *calomala* Blanco l. c. ed. 2 (1845) 306, ed. 3, 2: 204.

Monocera isotricha Turcz. in Bull. Soc. Nat. Mosc. 19² (1846) 494; Walp. Ann. 1. (1848) 112.
Elaeocarpus lancaefolius F.-Vill. Novis. App. (1880) 31, non Roxb.
Elaeocarpus oblongus F.-Vill. l. c.; Vid. Sinopsis Atlas (1883) *t. 21, f. A.* (poor), Rev. Pl. Vasc. Filip. (1886) 72; Perk. Frag. Fl. Philip. (1904) 100, *p. p.*; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 90; Aug. DC. in Elm. Leafl. Philip. Bot. 2 (1909) 636, non Gaertn.
Elaeocarpus isotrichus F.-Vill. l. c.; Aug. DC. l. c.
Elaeocarpus philippinensis Warb. in Perk. Frag. Philip. (1904) 100; Aug. DC. l. c. 636.

This much named endemic species is of wide distribution in Luzon and Mindoro, its oldest valid specific name being here adopted. Blanco's description is quite good and agrees perfectly with the material cited below. It is, moreover, the only form known to me from Luzon to which his description can be referred. His material was from the Province of Batangas, and his specific name is from its Tagalog name *calomala.*

Elaeocarpus isotrichus (Turcz.) F.-Vill. has been considered by several authors as a species of doubtful status. It was based on *Cuming 836* in Turczaninow's herbarium, but this number in other herbaria is *Medinilla cumingii* Naud. Through the kindness of the Director of the Botanical Institute of the University of Kharkoff I have been able to examine Turczaninow's type, and find it to be the common Luzon form, identical in all respects with the species recently described by Warburg as *Elaeocarpus philippinensis;* of the later I have examined the type in the Berlin Herbarium, an unnumbered specimen of Cuming's collection.

Elaeocarpus oblongus Gaertn. apparently does not occur in the Philippines, the numerous specimens so named having been determined as such through error. The exact status of Gaertner's species is doubtful, as it was based primarily on *Ganitrum oblongum* Rumph. Herb. Amb. 3: 161, *t. 102,* from which the specific name was taken. The only description given by Gaertner is that of the fruit, taken from a specimen in the Leiden Herbarium, its origin not indicated. Rumphius's figure represents a plant with entire leaves, a form entirely different from the *Elaeocarpus oblongus* of all modern authors except Gaertner and DeCandolle.

LUZON, without definite locality, *Cuming 836* (type of *Monocera isotricha* Turcz.), *Cuming s. n.* (type of *Elaeocarpus philippinensis* Warb.): Subprovince of Benguet, *Elmer 6084:* Province of Bataan, *For. Bur. 2937 Borden, For. Bur. 2852 Meyer, For. Bur. 17602 Curran:* Province of Rizal, *Phil. Pl. 1065 Ramos, Bur. Sci. 2665 Ramos, Merrill 1719, For. Bur. 454, 2906, 3201 Ahern's* collector: Province of Tayabas, *For. Bur. 6693 Kobbe.* MINDORO, *Merrill 1174, 2375, Whitford 1392, For. Bur. 3727, 4059 Merritt.*

THYMELAEACEAE

AQUILARIA Lamark

AQUILARIA MALACCENSIS Lam. Encycl. 1 (1783) 49; Gamble in Journ. As. Soc. Beng. 75² (1912) 264.

LUZON, Province of Camarines, Salauigan, *For. Bur. 21452 Alvarez,* May, 1914.

The identification was originally made from Gamble's description, Alvarez's specimens being in fruit, no flowers available. Through the kindness of Mr. I. H. Burkill, director of the Botanic Garden, Singapore, I have

recently received a fruiting specimen of Lamark's species from Malacca, and consider the Philippine plant to be specifically identical with the Malacca one. The genus is new to the Philippines.

BEGONIACEAE

BEGONIA Linnaeus

BEGONIA ALBA sp. nov. § *Diploclinium.*

Herba parce bruneo-setosa praesertim partibus junioribus; foliis longe petiolatis, subreniformibus vel subrotundatis, integris vel leviter undulatis, basi profunde subaequaliter cordatis, palmatim 7- vel 9-nerviis; floribus masculinis paucis, albis, circiter 2.5 cm diametro, bracteis orbicularibus, deciduis; staminibus circiter 20.

A succulent herb, the rhizome creeping, rather slender, glabrous or nearly so, the stipules persistent only at the growing tip, sparingly brown-setose, ovate, acuminate, submembranaceous, about 1.5 cm long. Petioles up to 30 cm in length, glabrous, or when young with few, long, scattered, brown, setose hairs. Leaves chartaceous when dry, pale-brownish, orbicular or subreniform, up to 15 cm long and 17 cm wide, entire or the margins slightly undulate, very broadly rounded, subequilateral, the base deeply and subequally cordate, the sinus very narrow, up to 4 cm deep, the basal lobes very broadly rounded, the upper surface glabrous, the lower with long scattered, brown hairs when young, becoming glabrous or nearly so, the margins distinctly brown-setose; nerves 7 or 9, radiating from the base, prominent, forked, the lateral ones above the base 2, rarely 3 pairs; petioles up to 30 cm in length, brown-setose when young, becoming glabrous. Scape rather slender, 20 cm long or less, the staminate flowers few, subumbellately cymose at the apex of the peduncle, the primary branches 2 or 3, 1 cm long or less. Bracts prominent, orbicular or subreniform, membranaceous, deciduous, white, about 6 mm in diameter, two subtending each flower. Staminate flowers: Sepals 2, elliptic to elliptic-orbicular, broadly rounded, about 12 mm long. Petals 2, oblong-oblanceolate, about 10 mm long, narrowed below. Stamens about 20; filaments 1 mm long; anthers narrowly obovoid, as long as the filaments. Pistillate flowers and fruits not seen.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19963 McGregor*, February, 1913.

A very characteristic species, at once distinguishable by its nearly equilateral, entire, deeply and subequally cordate leaves, and by its few, comparatively large, white flowers. In vegetative characters it resembles *Begonia suborbiculata* Merr., of Palawan, but is entirely different from that species in its floral characters.

BEGONIA BILIRANENSIS sp. nov. § *Diploclinium.*

Herba subtus foliis ad nervos petiolis pedunculisque brunneo-setosis, caulibus prostratis; foliis confertis, longe petiolatis, usque ad 22 cm longis, oblique ovatis, acuminatis, valde inaequilateraliter cordatis, margine undulatis vel parce undulato-lobatis; inflorescentiis folia subaequantibus, multifloris, floribus masculinis circiter 11 mm diametro, sepalis orbiculari-ovatis, quam petalis multo latioribus; staminibus circiter 60; capsulis circiter 1 cm longis, 1.5 cm latis, subaequaliter 3-alatis, alis rotundatis.

Stems creeping, rather stout, more or less brown-setose and with brown, ovate, acuminate stipules about 1 cm long, the leaves crowded, the peduncles, leaves on the nerves beneath, and petioles prominently brown-setose, the petioles 11 to 18 cm long. Leaf-blades obliquely ovate, strongly inequilaterally cordate, submembranaceous when dry, 15 to 22 cm long, 10 to 15 cm wide, acuminate, margins undulate or somewhat undulate-lobed, the upper surface somewhat olivaceous when dry, slightly shining, minutely puncticulate, glabrous, the lower surface greenish- or brownish-olivaceous, the nerves in strong contrast, brown, brown-setose on the nerves and primary reticulations, everywhere white-puncticulate, the nerves about 10. Inflorescence about as long as the leaves, long-peduncled, ample, with both male and female flowers. Male flowers white or very pale-pink, about 11 mm in diameter. Sepals orbicular-ovate, rounded, about 5.5 mm long, 5 mm wide. Petals oblong-obovate, rounded, narrowed below, as long as the sepals, about 2 mm wide. Stamens about 60; anthers 0.6 mm long, obovoid, as long as the filaments. Female flowers: Sepals 2, broadly elliptic-ovate, rounded, about 6 mm long, 5 mm wide. Petals 2, as long as the sepals, oblong-obovate, 2.5 mm wide. Styles 3, about 3 mm long, forked above, the stigmas spiral. Capsules about 1 cm long, 1.5 cm wide, including the wings, the wings 3, subequal, rounded.

BILIRAN, *Bur. Sci. 18822* (type), *18760, 18544 McGregor*, June, 1914, on rocks in forests, altitude 100 to 800 meters.

A species allied to *Begonia mindorensis* Merr., but with larger leaves, smaller flowers, and decidedly larger fruits.

BEGONIA PLATYPHYLLA sp. nov. § *Petermannia.*

Herba erecta, ramosa, *B. cumingii* affinis, differt foliis latioribus, usque ad 9 cm latis, minus pubescentibus, floribus masculinis multo minoribus, petalis circiter 5 mm longis.

An erect branched herb, nearly glabrous. Leaves inequilateral, broadly oblong to oblong-ovate, 11 to 18 cm long, 7 to 9

cm wide, chartaceous, the apex abruptly short-acuminate, the base scarcely narrowed, one side much narrower then the other, acute, the broader side very broadly rounded, forming a shallow, wide sinus with the petiole, the margins irregularly and rather coarsely toothed, not at all lobed, the primary teeth very broad, short, acute, the shallow sinuses denticulate; upper surface glabrous, subolivaceous when dry, slightly shining, the lower surface much paler, glabrous except for the slightly subfurfuraceous nerves; nerves prominent, nearly straight, forked, the basal ones usually 9, of which 2, sometimes 3, are on the narrower side of the lamina, the lateral nerves above the base 2 on the narrower side, 3 on the broader side, ascending, the reticulations lax, indistinct; petioles 3.5 to 5.5 cm long, when young somewhat brown-furfuraceous; stipules 2 cm long. Staminate and pistillate flowers in different inflorescences on the same plant. Staminate inflorescence terminal, lax, divaricately branched, up to 10 cm long, few-flowered. Flowers pink or white. Sepals 2, orbicular, about 5 mm in diameter. Petals none. Stamens about 30; anthers ellipsoid, about 1 mm long, equaling the filaments. Pistillate inflorescence axillary and terminal, few-flowered, 5 cm long or less, each flower subtended by 2, deciduous, oblong-elliptic, acute or obtuse, membranaceous bracts. Sepals 5, narrowly elliptic, narrowed at both ends, acute, about 1.3 cm long. Mature capsules, including the wings, turbinate, about 2 cm long, 2.5 cm wide, subequally 3-winged, the apex truncate, the upper outer corners of the wings rounded, the base broadly rounded.

LUZON, Province of Nueva Vizcaya, near Imugan, *Bur. Sci. 20074 McGregor*, January, 1912.

In comparison with *Begonia cumingii* A. Gray (*B. philippinensis* A. DC.), to which the species is manifestly allied, the striking differences are in the small staminate flowers and the relatively broad, nearly glabrous leaves of the present species.

BEGONIA MEGALANTHA sp. nov. § *Petermannia*.

Species *B. merrittii* affinis, differt ramulis et subtus foliis ad nervos prominente pubescentibus, foliis subintegris vel leviter dentatis, vix lobatis, petiolo brevioribus, floribus majoribus, petalis usque ad 2.5 cm longis.

An erect, branched shrub 1 to 2 m high, the stems very woody, stout. Branches and branchlets more or less zig-zag, prominently pubescent with short, more or less crisped, pale-brown hairs. Leaves inequilateral, oblong, chartaceous, 5 to 10 cm long, 1.8 to 4 cm wide, the upper surface brownish or olivaceous, slightly shining, the lower surface paler, densely puncticulate, glabrous except the midrib and nerves which are prominently

brown-pubescent, the hairs similar to those on the branchlets, the apex slenderly acuminate, somewhat falcate, the base not at all or but slightly narrowed on the broadly rounded wider side, slightly narrowed and acute or somewhat cordate on the narrower side, the margins distantly and slightly toothed, not at all lobed, the base 6 or 7-nerved, the primary lateral nerves above the base 2 on the narrower side, usually 3 on the broader side, ascending, forked, prominent on the lower surface, the reticulations lax, indistinct; petioles brown-pubescent, 2 to 4 mm long; stipules oblong, submembranaceous, about 7 mm long, their midribs excurrent as long and slender apiculi. Staminate and pistillate flowers on separate inflorescences on the same plant, in rather lax, few-flowered, terminal cymes, sometimes reduced to two or three, long-pedicelled flowers. Staminate flowers: Sepals 2, pure white to somewhat pink, broadly ovate, membranaceous, glabrous, 2 to 2.5 cm long, 2 to 2.3 cm wide, the base broadly cordate, the apex broadly rounded. Petals none. Stamens about 50, inserted on the slightly elongated torus, the filaments 2.5 mm long, the anthers narrowly oblong-obovoid, about 1.5 mm long. Bracts membranaceous, apiculate, about 7 mm long. Pistillate flowers: Bracts elliptic-ovate, membranaceous, 1 cm long, apiculate, two subtending each flower, deciduous; pedicels slender, pubescent, about 2.5 cm long. Sepals 5, narrowly ovate, membranaceous, acute or obtuse, about 2.3 cm long. Stigmas spirally arranged. Capsules turbinate, including the wings about 1.5 cm long and wide, subequally 3-winged, the apex truncate or somewhat cordate, the tips of the wings broadly rounded, the base acute or subtruncate, broadly rounded.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19857, 19858, 19859, 19860* (type) *McGregor*, February, 1913.

A striking species, manifestly closely allied to *Begonia merrittii* Merr., from which it is distinguished by the numerous characters indicated in the diagnosis. It is remarkable for its large size, the development of woody tissue in the stems, and its very large flowers.

BEGONIA LANCIFOLIA sp. nov. § *Petermannia.*

Erecta vel suberecta, ramosa, usque ad 60 cm alta, glabra, ramis ramulisque tenuibus; foliis lanceolatis, in siccitate membranaceis, viridis, usque ad 12 cm longis, deorsum angustatis, basi acutis vel obtusis, subaequilateralibus, apice longissime caudato-acuminatis, margine grosse irregulariter sinuato-lobatis; inflorescentiis terminalibus, paniculatis, tenuibus; floribus ♂ parvis, sepalis 2, petalis 0; capsulis 8 mm longis, aequaliter 3-alatis.

An erect or suberect branched glabrous herb 60 cm high or

more, the stems and branches slender, pale-brown when dry, sometimes geniculate and emitting small roots at the nodes. Leaves lanceolate, when dry membranaceous, green, of nearly the same color on both surfaces, glabrous, 8 to 12 cm long, 1.5 to 2.5 cm wide, narrowed below to the acute or obtuse, nearly equal or slightly inequilateral base, not at all cordate, the apex very long and slenderly caudato-acuminate, the acumen sharply toothed, the margins in the basal part entire, in the median portions coarsely and irregularly sinuate-lobed, about 3 lobes on each side of the midrib, the lobes acute, broad, the sinuses mostly rather shallow, rounded; stipules lanceolate, long and slenderly aristate-acuminate, about 10 mm long, 2 mm wide at the base; petioles slender, 1 to 2 cm long. Inflorescence terminal, 9 cm long or less, the branches and branchlets rather few, very slender, one or more female flowers at the base, the male flowers above, apparently rather numerous but early deciduous. Male flowers: Sepals 2, orbicular, broadly rounded, in nearly mature bud 4 mm in diameter. Petals none. Stamens about 25, the anthers oblong-obovoid, nearly 1 mm long. Capsules about 8 mm long, including the 3 subequal wings about 1.4 cm wide, the base truncate, the apex broadly rounded or subtruncate, the wings thin, rounded.

BASILAN, *Bur. Sci. 16162 Reillo*, August 23, 1912, in forests, Camalarang River.

Most closely allied to *Begonia littleri* Merr., also known only from Basilan, but distinguished by its entirely different leaves, and its equally 3-winged capsules. From *B. longistipula* Merr. and *B. palawanensis* it not only differs in its much narrower, differently shaped leaves, but also in its very much smaller capsules.

BEGONIA LACERA sp. nov. § *Petermannia.*

Species praecedente affinis, differt foliis brevioribus angustioribusque, usque ad 7 cm longis, 1 cm latis, irregulariter lacerato-lobatis, stipulis brevioribus, circiter 6 mm longis, sepalis (fl. ♂) late ovatis, subacutis.

An erect, branched, slender herb about 40 cm high, quite glabrous, the branches and branchlets reddish-brown when dry, slender. Leaves lanceolate, thinly membranaceous when dry, green, 3 to 7 cm long, about 1 cm wide, narrowed to the subequilateral acute or obtuse base, the apex very long and slenderly caudate-acuminate, the margins irregularly lacerate-lobed in the median portion, the basal portion entire, the long and slender acumen sharply and rather coarsely toothed, the lobes few, rather narrow, acute or acuminate; petioles 5 mm long or less;

stipules lanceolate, 6 mm long, 1.8 mm wide below, long and slenderly aristate-acuminate. Inflorescence paniculate, terminal or in the uppermost axil, lax, 4 cm long or less, the branches few, slender. Flowers few, the staminate ones with 2, broadly ovate, subacute or obtuse, not rounded, sepals 3 mm in length. Petals none. Stamens about 20. Anthers broadly obovoid, rounded, 0.6 mm long. Female flowers apparently solitary at the base of the staminate panicle, the sepals lanceolate, acuminate or acute, 4 mm long, 1.2 to 1.5 mm wide. Stigmas 3, about 1 mm long, spirally twisted. Capsules not seen, but from the female flowers (in anthesis) apparently equally 3-winged.

BASILAN, Cumalarang River, in forests, *Bur. Sci. 16111 Reillo*, August 30, 1912.

A rather striking species, distinguishable by its lanceolate, very slenderly acuminate, more or less lacerate-lobed leaves which are narrowed to the subequilateral acute or obtuse bases. It is manifestly allied to *Begonia lancifolia* Merr., but can be readily distinguished by its smaller, more narrowly lobed leaves, shorter petioles and stipules, subacute or obtuse sepals of the male flowers and fewer shorter anthers.

BEGONIA OLIGANTHA sp. nov. § *Petermannia.*

Herba erecta, parce ramosa, glabra, circiter 30 cm alta; foliis oblongis, vel anguste oblongo-obovatis, membranaceis, usque ad 7 cm longis, sinuato-dentatis, acuminatis, deorsum angustatis, leviter inequilateralibus, basi minute oblique subauriculatis; inflorescentiis terminalibus, paucifloris, floribus ♂ circiter 18 mm diametro, sepalis 2, late ovatis, petalis 2, oblanceolatis; capsulis 1.3 cm longis, aequaliter 3-alatis, basi rotundatis, apice truncatis.

An erect herb, glabrous throughout, about 30 cm high, sparingly branched, the stems and branches reddish-brown when dry. Leaves membranaceous when dry, green, oblong to narrowly oblong-obovate, 5 to 7 cm long, 1 to 2 cm wide, slightly falcate, narrowed below to the slightly inequilateral, obtuse, obliquely subauriculate base, and above to the slenderly acuminate apex, the margins distantly and irregularly sinuate-toothed; petioles 2 to 7 mm long; stipules narrowly lanceolate, long and slenderly acuminate, about 12 mm long, 1.5 mm wide. Inflorescence terminal or in the uppermost axil, paniculate, 5 to 7 cm long, the branches very few, few-flowered, slender. Male flowers: Sepals 2, broadly ovate, 9 to 10 mm long, about 6 mm wide, obtuse or narrowly rounded. Petals 2, oblanceolate, obtuse, 8 mm long, 2 mm wide. Stamens about 20, inserted on the elongated torus; anthers narrowly obovoid, rounded, base acute, 1.5 mm long. Pistillate flowers apparently solitary at the base of each panicle. Capsules 1.3 cm long, 1 to 1.5 cm

wide, equally 3-winged, broadly rounded at the base, the apex truncate, the upper outer angles sharp.

MINDANAO, Bukidnon Subprovince, Sumilao, *Bur. Sci. 15733 Fénix*, August 4, 1912, on wet rocky slopes, locally known as *tabaring*.

A species with the vegetative characters of *Begonia littleri* Merr., in general similar to that species, and to the allied forms *B. brevipes* Merr., *B. longistipula* Merr., and *B. palawanensis* Merr. It is at once distinguished by its large male flowers, which in this species are about 2 cm in diameter, while in the above species they do not exeeed 1 cm in diameter.

BEGONIA LATISTIPULA sp. nov. § *Petermannia.*

Herba erecta, ramosa, ramis ramulisque crassis, teretibus, parce setoso-ciliatis; foliis usque ad 13 cm longis, valde inaequilateralibus, oblongis vel ovato-oblongis, acuminatis, irregulariter lobatis denticulatisque, lateraliter cordatis, basi haud angustatis; stipulis 1.5 ad 2 cm longis, ovatis, cilato-setosis; floribus paucis, axillaribus, fasciculatis, ♂ 1 vel 2, longe pedicellatis, circiter 3 cm diametro, ♀ solitariis, subsessilibus; capsulis aequaliter 3-alatis, apice truncatis, basi acutis, circiter 1.5 cm longis, 2 cm latis.

An erect, sparingly branched, rather stout herb at least 50 cm in height, the stems and branches, stipules, petioles, and young leaves on the lower surface more or less setose-ciliate. Branches terete, reddish-brown when dry. Leaves thinly membranaceous when dry, strongly inequilateral, oblong to ovate-oblong, somewhat falcate, 9 to 13 cm long, 3 to 5 cm wide, when young ciliate-setose with brown hairs on the nerves of the lower surface, becoming glabrous or nearly so, the margins irregularly lobed, the broader side with one or two rather coarse, acute lobes and 5 or 6 much smaller ones more like coarse teeth, irregularly ciliate-denticulate, the apex rather slenderly acuminate, the base scarcely narrowed, prominently laterally cordate, the lobes rounded, that of the broader side very much wider than that of the narrow side; petioles 8 to 15 mm long, rather densely setose-ciliate with brown hairs; stipules ovate, somewhat inequilateral and slightly falcate, membranaceous, 1.5 to 2 cm long, 1 to 1.2 cm wide, prominently ciliate-setose on the margins, the midrib excurrent as a short mucro. Flowers axillary, fascicled, one male and one female, or two males and one female in the same axil. Male flowers: Pedicels slender, up to 2 cm long. Sepals 2, broadly ovate, rounded, 1.5 cm long. Petals none. Stamens about 20, inserted on the elongated torus; anthers narrowly ovoid, 2 mm long, rounded. Capsule subsessile or shortly pedicelled, triangular, the base acute, the apex

truncate, the outer upper angles sharp, about 1.5 cm long and 2 cm wide across the apex.

LEYTE, Dagami, *Bur. Sci. 15367 Ramos*, August, 1912, in forests near the summit of Mount Buraui.

A characteristic species readily distinguishable by its broad stipules and its rather large axillary fascicled flowers, two or three flowers in a fascicle, one of which is pistillate and one or two staminate, the former shortly pedicelled or subsessile, the latter long and slenderly pedicelled. Its alliance seems to be with *Begonia robinsonii* Merr., which, however, it does not greatly resemble.

ERICACEAE

DIPLYCOSIA Blume

DIPLYCOSIA FASCICULIFLORA sp. nov.

Species *D. parvifoliae* affinis, differt floribus fasciculatis, pedicellis brevioribus, ramis ramulisque glabris, vix setosis.

Apparently scandent, probably epiphytic, the branches terete, glabrous, dark reddish-brown, the branchlets paler, glabrous, not at all setose. Leaves coriaceous, elliptic to elliptic-oblong, dull, 2 to 4 cm long, 1 to 1.5 cm wide, when young with few, long, slender, brown, setose hairs on the margins, and scattered ones on both surfaces, when mature quite glabrous, the midrib prominent, lateral nerves obsolete, base and apex acute; petioles 2 to 3 mm long, slightly setose. Flowers small, pedicelled, in axillary fascicles, up to 8 in each fascicle, the pedicels slender, glabrous, 5 mm long or less, the basal bracts small, the apical bracteoles very broadly ovate, obscurely acuminate, puberulent. Calyx glabrous, somewhat accrescent and 2.5 mm long, the lobes triangular, acute, about 1 mm long. Corolla and stamens not seen.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19758 McGregor*, February 1, 1913.

A species very similar and manifestly closely allied to *Diplycosia parvifolia* Merr., of Negros, strongly resembling that species in vegetative characters, especially in the obsolete lateral nerves and reticulations. It differs from that species, however, in its flowers being fascicled, not solitary, its longer pedicels, and somewhat larger leaves.

VACCINIUM Linnaeus

VACCINIUM IRIGAENSE sp. nov.

Frutex glaber, circiter 5 m altus; foliis usque ad 6 cm longis, coriaceis, oblongo-obovatis, petiolatis, utrinque angustatis, basi acutis, tenuiter 5- vel 7-plinerviis, apice subrostrato-acuminatis; racemis axillaribus, solitariis, usque ad 6 cm longis, multifloris; floribus 1 cm longis, oblongis, sursum angustatis, ebracteolatis; filamentis pilosis.

A glabrous shrub about 5 m high, the branches dark reddish-brown, terete, shining, the branchlets brownish. Leaves coriaceous, rather narrowly oblong-obovate, 4.5 to 6 cm long, 1.5 to 2.5 cm wide, shining, the lower surface paler than the upper, narrowed below to the acute and slenderly 5- or 7-plinerved base, and above to the somewhat rostrate-acuminate apex, the acumen blunt, less than 1 cm long; reticulations slender, lax; petioles 5 mm long or less. Racemes axillary, solitary up to 6 cm long, rather many flowered. Flowers red, 1 cm long, their pedicels 6 to 7 mm long, ebracteate. Calyx glabrous, about 1.5 mm long, 3 to 3.5 mm in diameter, the lobes broadly ovate, blunt, 1 mm long or less. Corolla oblong, 3 mm in diameter below, narrowed above and 1 mm in diameter under the orifice, glabrous, the lobes slightly spreading, oblong, obtuse, 1 mm long. Stamens 10; filaments flattened below, somewhat pilose, 4 mm long; anthers oblong, truncate, straight or slightly curved, 1.5 mm long. Style stout, glabrous, 8 mm long.

LUZON, Province of Camarines, Mount Iriga, *Phil. Pl. 1549 Ramos*, December 3, 1913, in the mossy forest.

A species manifestly allied to *Vaccinium caudatum* Warb., from which it differs in its quite differently shaped leaves and larger flowers.

VACCINIUM MACGREGORII sp. nov.

Frutex erectus (vel scandens ?), inflorescentiis parce pubescentibus exceptis glaber; foliis magnis, coriaceis, usque ad 18 cm longis, petiolatis, basi acutis, apice subcaudato-acuminatis, anguste ovatis ad oblongo-ovatis, basi prominente 7-plinerviis; racemis paucifloris, pubescentibus, axillaribus, solitariis, usque ad 9 cm longis, bracteolis oblongo-lanceolatis, acuminatis, 2 cm longis, deciduis; corolla rubra, 1.6 cm longa, supra leviter ampliata.

An erect (or scandent ?) shrub, the branches slender, brownish, striate, somewhat zig-zag between the distant leaves, glabrous. Leaves narrowly ovate to oblong-ovate, coriaceous, shining on both surfaces, 14 to 18 cm long, 6 to 7 cm wide, entire, the base acute, the apex slenderly subcaudate-acuminate, the base prominently 7-plinerved, sometimes with an additional outer fainter pair, the inner one or two pairs reaching the apex, the primary reticulations lax, the ultimate ones rather dense; petioles stout, 8 mm long. Racemes axillary, solitary, up to 8 cm in length, each about 10-flowered, all parts sparingly pubescent with short, white, scattered hairs, the bracteoles oblong-lanceolate, sharply acuminate, about 2 cm long, deciduous, the pedicels 1 to 1.5 cm long. Calyx-tube cup-shaped, slightly constricted above, the limb somewhat spreading, making the whole

calyx somewhat urceolate, the tube 2.5 mm long, about 3 mm in diameter, the lobes 5, broadly triangular, acute or acuminate, 1.8 mm long, margins distinctly ciliate. Corolla red, slightly funnel-shaped, rather broad, 1.6 cm long, sparingly pubescent outside, the lobes 5, short, acute or rounded, about 4 mm wide and 2 mm long. Stamens 10; filaments 9 mm long, more or less pilose with long white hairs; anthers 8.5 mm long, narrowly oblong, base slightly curved and apiculate, the apical tubes laterally compressed, 5 mm long, the slit slightly oblique. Top of the ovary somewhat white-hispid; style 1.5 cm long, glabrous. Fruit unknown.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19846 McGregor*, February 11, 1913, indicated by the collector, with query, as a vine.

A species manifestly allied to *Vaccinium indutum* Vidal from which it is distinguished by its larger, more prominently nerved, glabrous or nearly glabrous leaves; from *Vaccinium barandanum* Vid., which it also resembles, it is distinguished by the vegetative characters just indicated and its pubescent inflorescence.

VACCINIUM TURBINATUM sp. nov.

Frutex epiphyticus, glaber; foliis crasse coriaceis, obovatis ad anguste obovatis, usque ad 9 cm longis, obtusis vel abrupte breviter obtuseque acuminatis, basi acutis, integris, margine revolutis, nervis utrinque 6, tenuibus, adscendentibus; floribus ignotis; racemis in axillis superioribus vel terminalibus, fructibus longe pedicellatis, turbinatis, circiter $\frac{1}{3}$ superioribus, 7 mm diametro.

An epiphytic glabrous shrub (flowers unknown), the branches olivaceous or brownish and more or less sulcate when dry, the growing parts reddish-brown. Leaves thickly coriaceous, obovate to narrowly obovate, 5 to 9 cm long, 2.5 to 5 cm wide, apex obtuse or abruptly, broadly, shortly, and obtusely acuminate, the base acute, entire, the margins revolute, with usually one or two pairs of prominent glands above the insertion of the petiole, shining on both surfaces, the upper surface pale, the lower one brownish when dry; lateral nerves about 6 on each side of the midrib, ascending, slender, not prominent, anastomosing; petioles stout, 5 to 7 mm long; bracteoles deciduous (not seen). Flowers unkown. Racemes, in fruit, about 5 cm long, in the uppermost axils or terminal, solitary, few, the pedicels about 1.5 cm long, thickened upward and about 2 mm thick at the apex, distinctly jointed to the calyx. Fruit turbinate, about 5 mm in diameter, one-third superior, the persistent calyx-teeth broadly triangular, acute or obtuse, about 2 mm long.

LUZON, Province of Laguna, San Antonio, in forests on trees, *Bur. Sci. 15068 Ramos*, June, 1912.

A characteristic species distinguishable by its fruit being one-third superior, the rounded upper part of the fruit as wide as the calyx in its thickest part, protruding above the persistent calyx-teeth. The plant somewhat resembles *Vaccinium jagori* Warb. in vegetative characters, but has larger, longer petioled leaves.

RHODODENDRON Linnaeus

RHODODENDRON LEYTENSE sp. nov. § *Vireya* ?

Frutex epiphyticus, subglaber, ramis ramulisque teretibus; foliis coriaceis, alternis vel subverticillatis, oblongis vel oblongo-ellipticis, usque ad 7 cm longis, utrinque angustatis acutisque, supra nitidis, subtus lepidotis, nervis lateralibus utrinque circiter 8, tenuibus, obscuris; floribus terminalibus, in umbellis sessilibus dispositis, bracteis involucrantibus caducis, oblongis, acuminatis, circiter 2.5 cm longis; corolla flava, 4 cm longa, late tubuloso-campanulata.

An epiphytic, nearly glabrous shrub, the branches and branchlets terete, grayish or reddish-brown, smooth, the ultimate ones about 2.5 mm in diameter. Leaves alternate or subverticillate, coriaceous, oblong to oblong-elliptic, 4 to 7 cm long, 1.5 to 3 cm wide, subequally narrowed to both the acute base and apex, or the base sometimes a little decurrent-acuminate, brownish when dry, the upper surface glabrous, shining, the lower somewhat paler, and with numerous, but not densely arranged, brown lepidote scales; lateral nerves slender, obscure, about 8 on each side of the midrib; petioles 1 to 1.5 cm long. Inflorescence terminal, the flowers in sessile umbels, in bud quite enclosed by imbricate bracts, the bracts caducous, brown when dry, glabrous, shining, oblong, acuminate, about 2.5 cm long, the bracteoles narrow. Flowers yellow, usually 4 or 5 in each umbel, their pedicels pubescent, about 1 cm long in anthesis, twice as long in young fruit. Calyx obsolete, represented by a mere thickening of the apex of the pedicel. Corolla broadly tubular-campanulate, yellow, about 4 cm long, the tube broad, about 2 cm long, the lobes broadly elliptic to obovate, rounded, 1.3 to 1.5 cm wide. Stamens 9 or 10, the filaments slender, a little unequal; anthers oblong, obtuse, 3 mm long. Ovary rather densely pubescent, cylindric, elongated, narrowed upward into the style which is pubescent below and glabrous above; stigma with 5, stout, broad, obtuse lobes.

LEYTE, Mount Ibuni, back of Dagami, *Bur. Sci. 15252 Ramos*, August 23, 1912, growing in the tops of trees.

A rather characteristic species, among the Philippine forms perhaps most closely allied to *Rhododendron kochii* Stein, although entirely different from that species in many details of its leaves, and in the color and character of its flowers.

SAPOTACEAE

BASSIA Koenig

There appears to be no reason whatever for substituting the generic designation *Illipe* for *Bassia*, as Baillon and Engler have done. This conclusion has been reached by Trimen, Cooke, and Gamble,[1] and at my request Mr. F. V. Coville has examined the original publication of the two names, expressing the opinion that *Illipe*, as published in Linn. Mantissa 2 (1771) 563, has no standing whatever as a published generic name. It is manifest that Koenig merely intended *Illipe* to represent one of the native names of the original species, *Bassia longifolia* Linn. This status of the names *Bassia* and *Illipe* is confirmed by Richter.[2]

Following Engler and Prantl several Philippine species have been referred to the genus *Illipe*, but are now transferred to the genus *Bassia*. It is possible that more complete material will necessitate the transfer of some to the genus *Payena*.

BASSIA BETIS (Blanco) comb. nov.

Azaola betis Blanco Fl. Filip. (1837) 402.
Payena betis F.-Vill. Novis. App. (1880) 125.
Illipe betis Merr. in Bull. Bureau of Forestry (Philip.) 1 (1903) 46.

A large tree of wide distribution in the Philippines, yielding a valuable timber commercially known as *betis*.

BASSIA CORIACEA (Merr.) comb. nov.

Illipe coriacea Merr. in Govt. Lab. Publ. (Philip.) 17 (1904) 41.

BASSIA MULTIFLORA (Merr.) comb. nov.

Illipe multiflora Merr. l. c.

BASSIA RAMIFLORA (Merr.) comb. nov.

Illipe ramiflora Merr. l. c. 42.

BASSIA MONTICOLA sp. nov.

Arbor circiter 8 m alta, glabra vel subglabra; foliis crasse coriaceis, oblongis ad oblongo-oblanceolatis, pallidis, nitidis, usque ad 14 cm longis, obtusis, basi cuneatis, nervis utrinque circiter 15; fructibus fasciculatis, e ramis defoliatis, ovoideis ad oblongo-ovoideis, in siccitate brunneis, glabris; sepalis late ovatis, extus parce pubescentibus glabrescentibus, circiter 6 mm longis.

A tree up to 8 m in height, nearly glabrous. Branches stout, terete, brownish, brown-pubescent at the attachment of the pedicels, otherwise glabrous, the branchlets with numerous petiolar scars. Leaves crowded near the apices of the branchlets, oblong to somewhat oblong-oblanceolate, thickly coriaceous, when dry pale and shining on both surfaces, 9 to 14 cm long,

[1] Trimen Fl. Ceyl. 2: 79; Cooke Bombay Flora (cited by Gamble); Gamble in Journ. As. Soc. Beng. 72[2] (1905) 176.
[2] Codex Botanicus Linnaeanus (1840) 455.

3 to 4 cm wide, narrowed upward to the obtuse apex and below to the cuneate base; lateral nerves about 15 on each side of the midrib, distinct on the lower surface, the reticulations lax, not prominent; petioles stout, 1 to 1.5 cm long. Flowers not seen. Fruits numerous, fascicled on the branches in the axils of fallen leaves, their pedicels brown, 1.2 to 2.2 cm long, glabrous, the points of attachment densely brown furfuraceous-pubescent. Young fruits brown when dry, ovoid to oblong-ovoid, glabrous, about 1.5 cm long, tipped by the rather stout 1 cm long style, the persistent calyx-lobes four, 2-seriate, broadly ovate, coriaceous, obtuse, the outer two about 6 mm long, 5 mm wide, the inner two somewhat thinner and a little broader, outside with few, appressed, dark-brown, shining hairs, becoming nearly or quite glabrous.

PALAWAN, Silanga Peak, *Merrill 9622,* May 30, 1913, in forests on the exposed peak, summit, altitude about 530 meters, distributed as *Payena.*

Apparently allied to *Bassia multiflora* Merr., but with relatively much narrower, less prominently nerved leaves.

BASSIA OBOVATIFOLIA sp. nov.

Arbor glabra circiter 20 m alta; foliis crasse coriaceis, obovatis, usque ad 12 cm longis, in siccitate nitidis, pallidis, apice obtusis, rotundatis vel retusis, basi cuneatis, nervis utrinque circiter 12; fructibus e axillis defoliatis, ellipsoideis, circiter 2.5 cm longis, pedicellis circiter 2 cm longis, sursum incrassatis; sepalis persistentibus, circiter 5 mm latis, irregulariter lacerato-retusis.

A tree about 20 m in height, entirely glabrous, the branches reddish-brown, terete, somewhat wrinkled when dry. Leaves thickly coriaceous, obovate to oblong-obovate, 7 to 12 cm long, 4 to 6.5 cm wide, pale and shining when dry, apex obtuse, broadly rounded or retuse, base narrowed, cuneate, margins recurved; lateral nerves about 12 on each side of the midrib, distinct, the reticulations lax, not prominent; petioles stout, about 1.5 cm long. Fruits solitary or in pairs in the axils of fallen leaves on the ultimate branchlets, in general ellipsoid, coarsely wrinkled when dry, pale-brownish, about 2.5 cm long, the style persistent as a slender straight apiculus up to 1 cm in length. Persistent calyx lobes 4, in two pairs, suborbicular, concave, coriaceous, about 5 mm wide, irregularly lacerate-retuse; pedicels about 2 cm long, rather prominently thickened upward.

LUZON, Province of Camarines, near Daet, *For. Bur. 21426* (type), *21454 Alvarez,* May, 1914, on forested slopes, 20 to 50 meters altitude.

A species similar to and manifestly closely allied to *Bassia coriacea* Merr., from which it is readily distinguished by its obovate leaves and fewer lateral nerves; distributed as *Palaquium.*

BASSIA MINDANAENSIS sp. nov.

Arbor circiter 15 m alta, floribus exceptis glabra; foliis oblongis, usque ad 23 cm longis, subcoriaceis, in siccitate brunneis, nitidis, apice breviter acuminatis, basi acutis, nervis utrinque 15 ad 17, subtus prominentibus; floribus axillaribus, fasciculatis, sepalis 2-seriatis, extus pubescentibus, circiter 7.5 mm longis; staminibus circiter 30; ovario glabro, 8-loculare.

A tree about 15 m high, glabrous except the flowers. Ultimate branches subterete, brown, smooth. Leaves oblong, subcoriaceous, brown and shining when dry, 12 to 23 cm long, 5 to 8 cm wide, base shortly but rather prominently acuminate, the acumen blunt, base acute, sometimes a little inequilateral; lateral nerves 15 to 17 on each side of the midrib, very prominent on the lower surface, the reticulations rather fine, distinct; petioles 1.5 to 2 cm long. Flowers white, fragrant, axillary, about 3 in each fascicle, their pedicels somewhat appressed-pubescent, 10 to 12 mm long. Sepals four, 2-seriate, the outer two broadly ovate, obtuse, coriaceous, appressed-pubescent, about 7.5 mm long, 6.5 mm wide, the inner two thinner, somewhat narrower, their margins ciliate. Corolla tube about 3.5 mm long, enlarged upward, villous inside, the lobes 8, erect, oblong-lanceolate, obtuse, 6 to 7 mm long, 1.5 to 2 mm wide. Stamens about 30, the filaments very short; anthers lanceolate, slenderly acuminate, about 4 mm long, slightly pubescent. Ovary glabrous, 8-celled; style about 1 cm long.

MINDANAO, Province of Misamis, east of Mount Catmon, *For. Bur. 17977 Miranda*, February 21, 1913, in forests along streams, altitude about 120 meters.

A species recognizable by its leaves turning brown in drying, its prominent nerves, and its glabrous ovaries.

BASSIA PLATYPHYLLA sp. nov.

Arbor alta, floribus exceptis glabra; foliis oblongo-ellipticis, usque ad 30 cm longis, coriaceis, pallidis, nitidis, apice rotundatis vel brevissime obtuse abrupteque acuminatis, basi acutis, nervis utrinque circiter 23, subtus valde prominentibus; floribus axillaribus, longe pedicellatis, sepalis coriaceis, extus leviter pubescentibus, late ovatis, obtusis, circiter 8 mm longis.

A tree reaching a height of about 20 meters, glabrous except the flowers. Ultimate branchlets terete, brown, 4 to 5 mm in diameter. Leaves oblong-elliptic, coriaceous, 23 to 30 cm long, 10 to 13 cm wide, pale and shining when dry, the apex rounded or very shortly, broadly, obtusely, and abruptly acuminate, base acute; lateral nerves about 23 on each side of the midrib, very prominent on the lower surface, curved-spreading, scarcely anas-

tomosing, the reticulations distinct; petioles 4.5 to 5.5 cm long, much thickened and rugose at the base. Flowers axillary, about 5 in each axil, the pedicels glabrous or very slightly pubescent, nearly 3 cm long. Calyx-lobes four, 2-seriate, coriaceous, broadly ovate, obtuse, about 8 mm long, 7 mm wide. Corolla and stamens not seen. Fruit "green, globose" (not seen) ; seeds brown, shining, about 18 mm long, 10 mm wide, slightly compressed, acute.

MINDANAO, District of Zamboanga, Margosatubig, *For. Bur. 21873 Villamil*, June 9, 1914, forested slopes, altitude about 70 meters.

A species characterized by its large leaves with numerous, very prominent nerves; flowering specimens may show it to belong in some other genus.

SIDEROXYLON Linnaeus

SIDEROXYLON VILLAMILII sp. nov.

Arbor alta partibus junioribus floribusque parce pubescentibus exceptis glabra; foliis oblongis, chartaceis vel subcoriaceis, usque ad 20 cm longis, nitidis, sursum angustatis, obtusis, basi cuneatis vel decurrento-acuminatis, nervis utrinque circiter 8, subtus prominentibus; floribus parvis, axillaribus, fasciculatis, breviter pedicellatis; sepalis 6, circiter 2 mm longis, extus parce pubescentibus; staminoideis oblongis, obtusis, integris, 0.7 mm longis; ovario dense hirsuto.

A tree reaching a height of 30 meters, glabrous except the slightly cinereous-pubescent flowers and pedicels and the growing tips of the branchlets. Branches terete, dark reddish-brown when dry, glabrous. Leaves oblong, chartaceous to subcoriaceous, 10 to 20 cm long, 3.5 to 7 cm wide, about equally narrowed to the obtuse tip and to the cuneate or decurrent-acuminate base, dark-olivaceous and shining when dry; lateral nerves about 8 on each side of the midrib, slender but prominent, curved, anastomosing, the reticulations lax, distinct; petioles 1 to 3 cm long. Flowers small, axillary, fascicled, up to 7 in each fascicle, the pedicels sparingly cinereous-pubescent, 3 to 5 mm long. Sepals 6, outside sparingly cinereous-pubescent, about 2 mm long, 1.5 to 2.5 mm wide, concave, rounded, the inner ones larger than the outer ones, varying from oblong-ovate to subreniform-ovate. Corolla tubular, about 2.7 mm long, glabrous, the lobes 5, orbicular-ovate, rounded, about 1 mm in diameter. Stamens 5, the filaments very short; anthers ovoid, acute, 0.6 mm long. Staminodes alternating with the corolla lobes, oblong, obtuse, entire, 0.7 mm long, glabrous. Ovary densely hirsute; style stout, glabrous, 2 mm long. Fruit globose or depressed-globose, glabrous, fleshy, when dry up to 4 cm in diameter, the seeds pale-

brown, shining, hard, somewhat compressed, about 1.8 cm long and 1.2 cm wide.

LUZON, Province of Laguna, Mount Maquiling, *For. Bur. 19762* (type), *20604 Villamil*, June and September, 1913, and from the same tree, *For. Bur. 13154 Curran*, November, 1911, with mature fruits, *For. Bur. 11927 Tamesis*, April, 1910, locally known as *dolitan*.

A species resembling in vegetative characters *Sideroxylon macranthum* Merr., but quite different in floral characters; it is readily distinguished by its very much smaller flowers which are but slightly pubescent.

SAPOTACEAE

PALAQUIUM Blanco

PALAQUIUM FOXWORTHYI sp. nov.

Arbor, partibus junioribus floribusque exceptis glabra; foliis coriaceis, oblongo-obovatis ad obovatis, usque ad 12 cm longis, in siccitate brunneis, nitidis, nervis utrinque 12 ad 14, apice breviter obtuseque acuminatis, basi cuneatis; floribus axillaribus, fasciculatis, sepalis extus pubescentibus; staminibus 16; ovario 6-loculare, pubescente; pedicellis circiter 1.5 cm longis, leviter pubescentibus.

A tree, apparently of large size, glabrous except the very tips of the branchlets, pedicels, and parts of the flowers. Branches terete, grayish-brown, glabrous. Leaves coriaceous, oblong-obovate to obovate, 8 to 12 cm long, 3 to 5 cm wide, dark-brown and shining when dry, the lower surface a little paler than the upper, the apex very shortly and broadly blunt-acuminate, base gradually narrowed, cuneate; lateral nerves 12 to 14 on each side of the midrib, prominent, the reticulations very fine; petioles 5 to 10 mm long. Flowers axillary and in the axils of fallen leaves, fascicled, 2 to 5 in each axil, their pedicels slightly pubescent, about 1.5 cm long. Sepals broadly ovate, about 3 mm long, the outer three thickly coriaceous, acute or slightly acuminate, the inner three rounded or obtuse. Corolla tube about 3 mm long, the lobes 6, reflexed, lanceolate, about 6 mm long, 2.5 mm wide. Stamens 16; filaments 3 mm long; anthers lanceolate, acuminate, 2.8 mm long. Ovary appressed-pubescent, 6-celled; style about 12 mm long.

LUZON, Province of Tayabas, Apad, *Bur. Sci. 13112 Foxworthy & Ramos*, March 8, 1911, in forested valleys, altitude about 30 meters.

A species similar to *Palaquium lanceolatum* Blanco, differing in its somewhat smaller leaves, much shorter, less pubescent pedicels, smaller flowers, and pubescent ovaries. To this species I tentatively refer the following sterile material: LUZON, Province of Laguna, *For. Bur. 22328 Mariano:* Province of Pangasinan, *For. Bur. 19441 Agama.*

PALAQUIUM GLABRUM sp. nov.

Arbor alta, sepalis interioribus exceptis glabra; foliis subcoriaceis, usque ad 16 cm longis, obovatis ad oblongo-obovatis, in siccitate brunneis, nitidis, apice obtusis ad rotundatis, basi cuneatis, nervis utrinque 8 ad 10, subtus prominentibus; floribus numerosis, axillaribus, fasciculatis, longe pedicellatis, sepalis exterioribus glabris, interioribus leviter pubescentibus; staminibus 18; ovario glabro, 6-loculare.

A tree about 20 m high, quite glabrous except the inner sepals. Branches terete, grayish-brown, rugose when dry. Leaves rather crowded on the ultimate branchlets, obovate to oblong-obovate, 11 to 16 cm long, 5 to 7 cm wide, subcoriaceous, brown and shining when dry, of about the same color on both surfaces, the apex obtuse to somewhat rounded, base gradually narrowed, cuneate; lateral nerves 8 to 10 on each side of the midrib, prominent on the lower surface, the reticulations very slender, not prominent; petioles 1 to 1.5 cm long. Flowers very numerous, in the axils of leaves and of fallen leaves, several in each axil, their pedicels slender, glabrous, about 3 cm long. Sepals 6, 2-seriate, broadly ovate, coriaceous, 3.5 to 4 mm long, the outer three quite glabrous, the inner three sparingly pubescent. Corolla lobes (in bud) 6, oblong, obtuse, glabrous, 3.5 mm long. Stamens 18; anthers lanceolate, acuminate, 2.5 mm long. Ovary glabrous, 6-celled; style stout, about 2.5 mm long.

LUZON, Province of Rizal, back of Bosoboso, *Bur. Sci. 13582 Ramos*, August 15, 1911, in forests along streams, locally known as *alacaac na puti*.

A very characteristic species, readily recognized by its long slender pedicels, and in being quite glabrous in all parts except the inner sepals.

PALAQUIUM HETEROSEPALUM sp. nov.

Arbor circiter 15 m alta, ramulis junioribus floribusque exceptis glabra; foliis crasse coriaceis, obovatis, apice rotundatis, basi cuneatis, usque ad 4 cm longis, nervis utrinque circiter 10, obscuris vel subobsoletis; floribus breviter pedicellatis, circiter 6 mm longis, sepalis 4 vel 6, staminibus 12.

A tree about 15 m high, quite glabrous except the growing tips of the branchlets and the flowers. Branches and branchlets rather stout, dark-colored when dry, glabrous. Leaves crowded toward the apices of the branchlets, thickly coriaceous, obovate, 2 to 4 cm long, 1.5 to 2.5 cm wide, brownish when dry, shining, apex broadly rounded, base cuneate; lateral nerves about 10 on each side of the midrib, very slender, obscure or nearly obsolete; petioles 5 mm long or less. Flowers in the axils of fallen leaves

on the ultimate branchlets, rather numerous, white, their pedicels slightly ferruginous-pubescent with short appressed hairs as are the sepals externally. Sepals 4 or 6, orbicular-ovate, coriaceous, rounded, 2 to 3 mm long, the inner two or three a little larger than the outer two or three. Corolla about 6 mm long, the tube about 1.5 mm, the lobes 6, oblong-elliptic, rounded or obtuse, about 4.5 mm long, 2.5 to 3 mm wide, externally very slightly pubescent. Stamens 12; anthers oblong, acute or acuminate, about 2.5 mm long. Ovary ovoid, pubescent, 5- to 7-celled, narrowed upward into the rather stout style, the ovary and style about 6 mm long.

LUZON, Province of Rizal, Mount Susong Dalaga, *Bur. Sci. 19160 Reillo*, December 6, 1914, altitude not indicated, but from the mossy forest.

The species somewhat resembles a small leaved form of *Palaquium cuneatum* Vidal, and is characterized not only by its unusually small leaves, but by its very obscure, often nearly obsolete nerves, very short pedicels, and the variable number of sepals, either 4 or 6; in those flowers with 4 sepals, however, there are always 6 corolla lobes and 12 stamens. I know of no other species of *Palaquium* where the number of calyx lobes is variable.

PALAQUIUM LANCEOLATUM Blanco Fl. Filip. (1837) 403, ed. 2 (1845) 282, ed. 3, 2 (1878) 159.

This species is of importance as it is the type of the genus *Palaquium* Blanco, and no material previously referred to the species, unless it be Vidal's specimen cited by Dubard, has agreed with Blanco's description in essential characters; specimens referred by me at various times to the species have correctly been indicated by Dubard as a distinct species, *Palaquium merrillii* Dubard,[1] as Blanco's species has 18 stamens, and the material Dubard has referred to *P. merrillii* has but 12 stamens. Specimens in flower, recently collected, agree in practically all details with Blanco's description, and I feel perfectly confident that the present interpretation of the species is the correct one, and an amplification of Blanco's description follows:

A tall tree, quite glabrous except the younger parts and the flowers. Branchlets and young petioles ferruginous-pubescent. Leaves oblong to oblong-oblanceolate or obovate, rarely approaching the lanceolate type, coriaceous or subcoriaceous, brown and shining when dry, glabrous on both surfaces, shortly and obtusely acuminate to obtuse or even rounded at the apex, base narrowed, cuneate; lateral nerves about 11 on each side of the midrib, prominent, the reticulations fine; petioles about 1 mm long. Flowers numerous, axillary, in the axils of leaves and of fallen leaves on the ultimate branchlets, fascicled, their pedicels ferruginous-pubescent, 2.5 to 4 cm long. Outer 3 sepals densely ferruginous-pubescent, ovate, acute to somewhat acuminate, cori-

[1] Bull. Mus. Hist. Nat. Paris 15 (1909) 381.

aceous, about 4.5 mm long, 3 to 3.5 mm wide, the inner three thinner, oblong to oblong-elliptic, obtuse, pubescent, 4 to 4.5 mm long, 2.5 to 3 mm wide. Corolla glabrous, the tube about 3 mm long, the lobes lanceolate, acuminate, reflexed, about 8 mm long, 2 mm wide. Stamens 18; filaments 4 to 5 mm long, 3 to 3.5 mm wide. Ovary glabrous, 6-celled; style 12 to 15 mm long.

LUZON, Province of Tayabas, Mauban, *Bur. Sci. 19483 Ramos*, January, 1913: Province of Camarines, Sagnay, *Bur. Sci. 22135 Ramos*, December, 1913.

As to Blanco's description, the above specimens agree with it absolutely in all respects except that the leaves are not "lanceoladas," but while some approach the lanceolate type, most of them are oblong-obovate to oblong-oblanceolate; they are glabrous and the petioles are short. The flowers agree perfectly especially in the corolla lobes "estrechas, aguzadas, y muy revueltas hácia abajo." The stamens are 18 (in Blanco's description 18, 19, or fewer); ovary (fruit) 6-celled; style longer than the stamens. Blanco gives the date of flowering as March, but saw only old dried flowers; his specimens were from the Province of Batangas which may account for the difference in the time of flowering, which at most would be about one month, as the specimens from Camarines were collected on January 25. The native (Tagalog) name *bagalañgit* does not appear on any of our specimens of *Palaquium*.

Whether or not "Vidal 7" referred to Blanco's species by Dubard is the same as my interpretation of Blanco's species I cannot say. I have a copy of Pierre's detailed drawing of the flower, apparently taken from young buds, and it does not appear to be the same as the specimens cited above; the differences, however, may be due to the stage of development. At any rate, Pierre's drawing does not agree with Blanco's description in the corolla lobes which in Vidal's specimen are rounded and merely elliptic, not "estrechas, aguzadas."

PALAQUIUM NEGROSENSE sp. nov. § *Palaquoides*.

Arbor circiter 20 m alta, partibus junioribus inflorescentiisque exceptis glabra; foliis crasse coriaceis, obovatis, usque ad 22 cm longis, in siccitate brunneis, nitidis, apice late rotundatis, basi angustatis, cuneatis, nervis utrinque circiter 12, subtus prominentibus; floribus axillaribus, paucis, sepalis extus pubescentibus; staminibus 18; ovario parce pubescente, 6-loculare.

A tree about 20 m high, glabrous except the younger parts and the flowers. Branches rather stout, terete, brown, the growing tips somewhat ferruginous-pubescent, as are the very young petioles, the pedicels, and the calyx externally. Leaves thickly coriaceous, obovate, 14 to 22 cm long, 6 to 12 cm wide, apex broadly rounded, base gradually narrowed, cuneate, when dry brown and shining on both surfaces; lateral nerves about 12 on each side of the midrib, prominent, the reticulations very fine; petioles 1.5 to 2.5 cm long. Flowers few, axillary and in the

axils of fallen leaves, but one or two in each axil, the pedicels ferruginous-pubescent, up to 3 cm long. Young sepals broadly ovate, obtuse, ferruginous-pubescent, coriaceous, about 4 mm long. Very young corolla-lobes elliptic-ovate, rounded or slightly retuse, 3 mm long. Stamens 18, the young anthers 2 mm long. Ovary very slightly pubescent, 6-celled. Fruit oblong, inequilateral, up to at least 3 cm in length (immature) tipped by the style which is up to 14 mm in length, glabrous.

NEGROS, Cadiz, *For. Bur. 15029 Danao*, March, 1908; Paniquon River, *For. Bur. 7325 Everett*, March, 1907; near San Carlos, *For. Bur. 20696 Tamesis* (type), September, 1913, locally known as *nato* and *bayog*.

This is the species that Dubard has referred, with doubt, to *Palaquium obovatum* King & Gamble,[10] from fruiting specimens; a more recent collection, however, presents young flowers, and an examination of these shows 18, not 12 stamens, so that the specimens must be referred to the section *Palaquoides*, not to *Eupalaquium*, to which *P. obovatum* belongs. It is closely allied to *Palaquium lanceolatum* Blanco, differing in its larger leaves which are broadly rounded at the apex, not at all acuminate, its somewhat shorter pedicels, its much fewer flowers, but one or two in each axil, and its slightly pubescent ovary.

APOCYNACEAE

ALYXIA R. Brown

ALYXIA CONFERTIFLORA sp. nov.

Species ut videtur *A. lucidae* Wall. affinis, differt inflorescentiis valde congestis, haud pedunculatis, quam petiolo multo brevioribus, floribus longioribus, circiter 1 cm longis.

A scandent shurb, quite glabrous except the inflorescence. Branches smooth, reddish-brown, distinctly 4-angled. Leaves fragrant in drying, whorled, 4 in each whorl, oblong, chartaceous to subcoriaceous, 6 to 10 cm long, 2 to 3.5 cm wide, about equally narrowed at both ends, the apex blunt-acuminate, the base decurrent-acuminate, both surfaces slightly shining when dry, the lower a little paler than the upper, the margins recurved; lateral nerves very slender, indistinct, about 50 on each side of the midrib, anastomosing with the faint submarginal nerve; petioles 1 to 1.5 cm long. Cymes axillary, sessile or very shortly peduncled, congested, about 0.8 mm long (excluding the corollas), pubescent, the flowers sessile, 5-merous, each subtended by an ovate, pubescent, acute or acuminate bract about 3 mm long and several similar but much smaller bracteoles. Calyx 3 mm long, the lobes ovate, acute, about 2 mm long, ciliate-pubescent or puberulent. Corolla-tube cylindric, externally glabrous, 10 mm long, swollen above opposite the anthers, contracted at the

[10] Bull. Mus. Hist. Nat. 15 (1909) 280.

throat, the tube prominently pubescent inside; lobes spreading-recurved, orbicular, 3 mm in diameter. Anthers narrowly ovate-lanceolate, 1.2 mm long. Ovary short, pubescent. Fruit not seen.

BASILAN, *Bur. Sci. 16143 Reillo,* September, 1912.

A species manifestly allied to the Malayan *Alyxia lucida* Wall., which it greatly resembles, but from which it is distingushed by its congested inflorescence which is much shorter than the petioles, its longer flowers, and more numerously nerved leaves. It is also closely allied to *Alyxia odorata* Wall., perhaps closer to this than to *A. lucida*, but is distinguishable by its acuminate, not acute or obtuse leaves, shorter cymes, sessile flowers, and orbicular, not ovate, corolla-lobes.

ALSTONIA R. Brown

ALSTONIA OBLONGIFOLIA sp. nov. § *Dissuraspermum.*

Arbor circiter 10 m alta, ramulis subtus foliis inflorescentiisque leviter pubescentibus; foliis ternis vel quaternis, chartaceis vel subcoriaceis, subtus pallidis, oblongis ad oblongo-lanceolatis, usque ad 14 cm longis, nervis distantibus, utrinque 14 ad 18, distinctis; inflorescentiis terminalibus, floribus circiter 8 mm longis.

A tree about 10 m high. Branches obscurely angled, slightly pubescent. Leaves whorled, 3 or 4 at each node, oblong to oblong-lanceolate, narrowed and somewhat acuminate at both ends, chartaceous or subcoriaceous, 6 to 14 cm long, 2 to 4 cm wide, the upper surface glabrous, shining, brown when dry, the lower surface much paler, slightly pubescent, especially on the midrib and nerves; nerves distant, spreading, distinct, brown, 14 to 18 on each side of the midrib, the reticulations slender, not prominent; petioles somewhat pubescent, less than 1 cm long. Inflorescence terminal, sessile, that is numerous peduncles springing from the apex of the branchlet, the peduncles slender, slightly pubescent, 2 to 7 cm long, subumbellately or corymbosely branched at their apices, the branches gray-villous but not densely so. Flowers numerous, white, their pedicels 1 to 2 mm long. Calyx cup-shaped, slightly gray-pubescent, about 1.5 mm long, the lobes very short. Corolla-tube about 5 mm long, cylindric, slightly pubescent on the outside, somewhat inflated above the middle opposite the insertion of the stamens, inside and throat villous, the lobes oblong, obtuse, 3.5 to 4 mm long, overlapping to the right, their margins ciliate-villous. Anthers inserted above the middle, about 1 mm long. Ovary glabrous, narrowed into the slender, 2 mm long style.

PALAWAN, in old clearings near Puerto Princesa, *For. Bur. 4495 Curran,* June 5, 1906.

A species apparently allied to *Alstonia angustifolia* Wall., of the Malay Peninsula, but differing in many characters, notably, in its quite different flowers.

KICKXIA Blume

KICKXIA BLANCOI Rolfe in Journ. Linn. Soc. Bot. 21 (1884) 313.

Kickxia arborea Vid. Sinopsis Atlas (1883) *t. 67, f. G;* F.-Vill. Novis. App. (1880) 132; Naves in Blanco Fl. Filip. ed. 3, *t. 428 bis*, non Blume.

Kickxia merrittii Merr. in Philip. Journ. Sci. 4 (1910) Bot. 355.

Kickxia macgregorii Elm. Leafl. Philip. Bot. 4 (1912) 1457.

Rolfe's species is typified only by the plate in the third edition of Blanco's Flora de Filipinas, no description having been published; the plate well represents the species as here interpreted. There is some variation in vegetative characters, but in essentials the species is quite constant. A careful examination of all available material has convinced me that the two recently described species, above cited as synonyms, are not distinct from *Kickxia blancoi* Rolfe. The species is sometimes known as *lanete*, as *laneting gubat*, and as *ayate*, and probably represents the form mentioned by Blanco Fl. Filip. (1837) 114, ed. 2 (1845) 81 after the description of *Anasser laniti* as "Hai otra especie con las flores axilares solitarias." It is represented by the following material:

LUZON, Province of Batangas, Looc, *For. Bur. 7649 Curran & Merritt;* Santo Tomas, *For. Bur. 21545 Tamesis:* Province of Laguna, Calamba, *For. Bur. 20964 Villamil.* MINDORO, *For. Bur. 11488 Merritt* (type of *K. merrittii* Merr.). GUIMARAS, *For. Bur. 862 Gammill.* SIBUYAN, *Elmer 12373* (type number of *K. macgregorii* Elm.). NEGROS, *For. Bur. 15112 Tabat.* LEYTE, *Wenzel 330*, July, 1913. Without definite locality, *Loher 6329.*

By description alone *Kickxia macgregorii* Elm. appears to be a remarkably distinct form, but this is due to errors in the description. "Calyx 1.5 to 2.25 cm long" is the description of the pedicel, the calyx being very short; the pedicel is subtended by a very few, small, obscure bracteoles. The flowers are about 6 cm long as in the other specimens referred to *Kickxia blancoi* Rolfe and as represented by Naves' plate.

TABERNAEMONTANA Linnaeus

TABERNAEMONTANA HEXAGONA sp. nov.

Frutex glaber, circiter 2 m altus; foliis chartaceis vel submembranaceis, oblongo-ellipticis, usque ad 17 cm longis, acutis ad abrupte obtuseque acuminatis, nervis utrinque circiter 14, patentibus; pedunculis axillaribus, ut videtur paucifloris; fructibus oblongo-lanceolatis, rectis, acuminatis, basi acutis, 6-angulatis vel angulis propriis (3) anguste 3-alatis, alternantibus vix alatis, circiter 6 cm longis, in siccitate minute verruculosis.

A glabrous shrub, according to the collector about 2 m high. Branches terete, light-gray, the younger ones somewhat compressed when dry. Leaves membranaceous to somewhat chartaceous, oblong-elliptic, the larger ones 13 to 17 cm long, 4 to 7 cm wide, base acute or decurrent-acuminate, apex acute to

shortly, broadly, and obtusely acuminate, when dry shining, the upper surface pale-olivaceous, the lower very much paler; lateral nerves about 14 on each side of the midrib, spreading, evanescent or subevanescent near the margins, sometimes obscurely anastomosing, the reticulations subobsolete; petioles 1 cm long or less, inflated at the base on the upper side. Peduncles axillary, apparently few-flowered (1-flowered ?), in fruit 3 to 4 cm long. Flowers not seen. Follicles two, free to the very base, oblong-lanceolate in outline, straight, not at all curved, acute at the base, acute or somewhat rostrate-acuminate at the apex, about 6 cm long, 1.3 to 1.5 cm in diameter, 6-angled, or better with 3 longitudinal, narrow wings, and 3 alternating, less prominent ridges, the pericarp coriaceous, greenish-olivaceous when dry, shining, minutely verruculose. Seeds about 24 in each follicle, irregularly oblong-obovoid, about 7 mm long.

PANAY, Capiz, *Bur. Sci. 21241 Escritor*, June, 1913.

The species presents no particularly striking vegetative characters by which it may be distinguished from some other species. Its follicles, however, are very distinct in form, being quite different from those of any other species known to me except the following one. They are straight, not at all falcate as is usually the case in this genus, free to the very base, oblong-lanceolate in outline, acuminate, and with 3 longitudinal, narrow, thick wings, and 3 alternating, less prominent ridges.

TABERNAEMONTANA MINDANAENSIS sp. nov.

Frutex glaber 2 ad 4 m altus; foliis chartaceis, oblongo-lanceo-altis ad late oblongo-oblanceolatis, usque ad 12 cm longis, utrinque angustatis, apice acuminatis, basi acutis, nervis utrinque circiter 9; cymis axillaribus, brevibus, paucifloris; folliculis rectis vel leviter curvatis, oblongis vel oblongo-lanceolatis, acuminatis, 4 ad 5 cm longis, circiter 1 cm diametro.

A glabrous shrub about 4 m high. Branches terete, slender, gray, not lenticellate, the younger ones sometimes slightly compressed. Leaves chartaceous, oblong-lanceolate to broadly oblong-oblanceolate, 7 to 12 cm long, 2 to 4.5 cm wide, narrowed upward to the sharply acuminate apex, the acumen straight or somewhat falcate, somewhat apiculate, and to the cuneate base; lateral nerves about 9 on each side of the midrib, slender but prominent on the lower surface, the reticulations fine; petioles 4 to 8 mm long. Cymes axillary, few-flowered, in anthesis 4 cm long or less, somewhat elongated in fruit, the immature buds up to 1.5 cm long, the pedicels less than 1 cm in length. Follicles usually in pairs, oblong to lanceolate, 4 to 5 cm long, about 1 cm in diameter, straight or somewhat curved, with 4 rather prominent ridges and 2 less prominent ones, red, the base

acute, the apex acuminate, the pericarp coriaceous. Seeds about 20 in each follicle, irregular, about 6 mm long.

MINDANAO, District of Cotabato, Craan, *For. Bur. 14930 Tarrosa & Almagro*, April, 1912 (type); Reina Regente, *Bur. Sci. 11653 Robinson*, June, 1910, in thickets and open places at low altitudes.

A species in vegetative characters somewhat resembling the common *Tabernaemontana pandacaqui* Poir., but with entirely different fruits, which resemble those of *Tabernaemontana hexagona* Merr.; it differs from *T. hexagona* Merr. in its smaller, much fewer nerved leaves.

TABERNAEMONTANA OLIGANTHA sp. nov.

Frutex glaber circiter 2 m altus; foliis membranaceis vel chartaceis, oblongo-ellipticis, usque ad 15 cm longis, utrinque subaequaliter angustatis, apice acuminatis apiculatisque, basi acutis, nervis utrinque circiter 9, subtus prominentibus; cymis axillaribus, laxis, circiter 10 cm longis, paucifloris; floribus albis, longe pedicellatis, circiter 2.5 cm diametro, corollae tubo circiter 1.7 cm longo.

A glabrous shrub about 2 m high with very lax, few-flowered, axillary cymes, the flowers about 5 to each cyme, long pedicelled. Branches terete, slender, grayish-brown, lenticellate. Leaves membranaceous to chartaceous, oblong-elliptic, 12 to 15 cm long, 5 to 7 cm wide, olivaceous and somewhat shining when dry, subequally narrowed to the acute base and to the distinctly acuminate and slightly apiculate apex; lateral nerves about 9 on each side of the midrib, prominent on the lower surface, curved, obscurely anastomosing, the reticulations fine; petioles 5 mm long or less. Cymes axillary, solitary, about 10 cm long, each about 5-flowered, the branches divaricate, lax. Flowers white, their pedicels 1.5 to 3.5 cm long. Calyx 4 to 5 mm long, the lobes elliptic-ovate, obtuse or acute, 2.5 to 3 mm long. Corolla tube cylindric, 1.5 to 1.8 cm long, the lobes spreading, 12 to 13 cm long, 4 to 5 mm wide, oblong, falcate, rounded. Anthers 2 mm long. Ovary glabrous.

SAMAR, Cauayan Valley, forested slopes, *Phil. Pl. 1621 Ramos*, April, 1914.

A species well characterized by its long, very lax, few-flowered cymes, the flowers about 5 in each cyme, long pedicelled.

URCEOLA Roxburgh

URCEOLA IMBERBIS (Elmer) comb. nov.

Carruthersia imberbis Elmer Leafl. Philip. Bot. 2 (1909) 588.

LUZON, Province of Tayabas, Lucban, *Elmer 9239* (type number): Province of Laguna, San Antonio, *Bur. Sci. 12057 Ramos*, August, 1910, in fruit.

The species is in all respects a typical *Urceola* as evidenced by its very short flowers and valvate corolla lobes. It belongs in the group with *Urceola brachysepala* Hook. f. of the Malay Peninsula. The follicles are cylindric and brown when dry, not at all torulose, straight or slightly curved, about 13 cm long, 3 to 4 mm in diameter. The genus, which is new to the Philippines, is also represented by the following allied species:

URCEOLA PHILIPPINENSIS sp. nov.

Species praecedente similis et affinis, differt foliis chartaceis, haud coriaceis, calycis lobis longioribus prope ad basin porrectis.

A scandent shrub, glabrous except the inflorescence, the branches slender, terete, reddish-brown. Leaves chartaceous, oblong-ovate, brown or brownish-olivaceous when dry, slightly shining, 7 to 11 cm long, 3 to 5.5 cm wide, apex prominently acuminate, base rounded to subacute; lateral nerves about 7 on each side of the midrib, rather prominent, curved-anastomosing near the margin, the reticulations distinct; petioles 1 to 1.8 cm long, reddish-brown. Inflorescence corymbose, terminal and in the upper axils, frequently forming an ample, somewhat leafy inflorescence, 7 to 25 cm in width, the younger parts more or less villous with pale or brownish hairs. Flowers very numerous, crowded on the ultimate branchlets, the bracts subtending the primary branches linear, 5 to 15 mm long. Calyx pubescent, cleft nearly to the base, the lobes narrowly ovate, 1 to 1.3 mm long, acute. Corolla about 3 mm long, somewhat pubescent externally, the lobes 5, narrowly ovate, acute, about 1 mm long, valvate. Anthers about 1.3 mm long, base sagittate. Disk prominent, somewhat 5-costate. Ovary glabrous.

MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens 1098*, June, 1907 (type): Province of Surigao, *Piper 219, 512, 545*, May, 1911. LEYTE, Jaro, *Wenzel 689*, May, 1914.

A species manifestly closely allied to *Urceola imberbis* (Elm.) Merr., to which most of the specimens have previously been referred, differing in its thinner leaves and manifestly much more deeply cleft calyx. In *U. imberbis* the leaves, when mature, are rather thickly coriaceous, and the calyx lobes extend less than half way to the base.

URCEOLA LAEVIS (Elmer) comb. nov.

Carruthersia laevis Elmer Leafl. Philip. Bot. 4 (1912) 1449 (*leavis*).

Like *Carruthersia imberis* Elm., this species has the characteristic flowers of *Urceola* and must be transferred to that genus. It is readily distinguished from the two other Philippine species by its oblong-obovate bracts and bracteoles, fewer nerves, less prominently acuminate coriaceous leaves, and especially by its calyx lobes extending quite to the base.

PALAWAN, Puerto Princesa, *Elmer 12857*, March, 1911, type number.

VALLARIS Burman f.

VALLARIS DARONENSIS (Elmer) comb. nov.

Holarrhena daronensis Elmer Leafl. Philip. Bot. 4 (1912) 1455.

MINDANAO, District of Davao, *Elmer 11912* (type number), in fruit, October, 1909: District of Lanao, Camp Keithley, *Mrs. Clemens s. n.*, May, 1907, with young flowers: Province of Misamis, *Quadras 100*, from Talisayan, locally known as *pamacoton*.

This species is in all respects a *Vallaris*, not a *Holarrhena*, and is accordingly transferred to the former genus; it is closely allied to *Vallaris gitingensis* (Elmer) Merr., but has broader, more prominently nerved leaves and apparently somewhat larger flowers.

VALLARIS GITINGENSIS (Elmer) comb. nov.

Kickxia gitingensis Elmer Leafl. Philip. Bot. 4 (1912, March 18) 1455.
Vallaris angustifolia Merr. in Philip. Journ. Sci. 7 (1912, November 15) Bot. 335.

The name proposed by Mr. Elmer, sub *Kickxia*, has priority over that used by me, sub *Vallaris*, the latter being the proper genus as the anthers are exserted, not included in the corolla tube. Mr. Elmer's specific name is accordingly adopted, transferred to *Kickxia*, and *K. angustifolia* Merr. reduced as a synonym. The two are identical in all respects. *Vallaris gitingensis* is represented by the following material:

LUZON, Province of Laguna, Paete, *Holman 8*, April, 1910; Nangaiby, *For. Bur. 20175 Manuel*, September, 1913 (sterile): Province of Tayabas, Lucban, *Bur. Sci. 19537 Ramos*, January, 1913, in fruit: Province of Sorsogon, *For. Bur. 10507 Curran*, June, 1908, *For. Bur. 15077 Rosenbluth*, April, 1909 (type of *V. angustifolia* Merr.). SIBUYAN, *Elmer 12203*, April, 1910 (type number of *Kickxia gitingensis* Elmer). LEYTE, *Wenzel 652*, *678*, May, 1914. Some of the material has been distributed as *Vallaris holmanii* Merr., but I consider now that but a single species is represented.

The follicles are in pairs, about 20 cm long, 5 mm in diameter, narrowed at both ends, straight or slightly curved; seeds linear-lanceolate, about 2 cm long, the coma plumose, the hairs very soft, pale-brownish, abundant, 5 to 6 cm long.

VERBENACEAE

CALLICARPA Linnaeus

CALLICARPA LANCIFOLIA sp. nov.

Frutex 1 ad 4 m altus plus minusve stellato-pubescentibus glandulosisque; foliis lanceolatis vel anguste oblongo-lanceolatis, chartaceis, usque ad 20 cm longis, basi leviter inaequilateralibus, obtusis, apice longe caudato-acuminatis, supra parce simpliciter pubescentibus, eglandulosis, subtus leviter stellato-pubescentibus, glandulosis, nervis utrinque circiter 11; cymis axillaribus solitariis, laxis, 2 ad 4 cm longis, dichotomis; floribus 4-meris, circiter 3 mm longis, corolla glabra vel subglabra.

A shrub 1 to 4 m high. Branches terete, slender, subglabrous or more or less ferruginous-stellate-pubescent, the younger ones

densely stellate-pubescent and with scattered, longer, sparingly branched hairs intermixed. Leaves chartaceous, lanceolate to narrowly oblong-lanceolate, 15 to 20 cm long, 3 to 5 cm wide, narrowed above to the long and slender, often subfalcate, caudate-acuminate apex and below to the obtuse, usually slightly inequilateral base, the margins serrate-dentate, the teeth distinct, gland-tipped, the upper surface usually olivaceous when dry, eglandular, with scattered, short simple hairs, the lower surface usually somewhat paler, sparingly stellate-tomentose, minutely glandular; lateral nerves about 10 on each side of the midrib, distinct, curved-ascending, anastomosing; petioles densely stellate-tomentose, 5 to 8 mm long. Cymes axillary, solitary, peduncled, dichotomous, 2 to 4 cm long, rather lax and open, many-flowered, the branches divaricate, rather densely pubescent with simple and stellate hairs intermixed. Flowers lilac, 4-merous, small, the bracteoles linear, pubescent, small. Calyx about 1 mm long, sparingly hirsute-pubescent with short, straight, simple hairs, obscurely and subequally 4-toothed. Corolla-tube about 2 mm long, glabrous, the lobes 4, orbicular-ovate, rounded, about 1 mm long. Filaments 4 mm long; anthers 0.5 mm long. Style slender, 5.5 mm long, slightly thickened near the apex.

MINDORO, Mount Halcon, *Merrill 5556*. TICAO, *For. Bur. 2534 Clark*. CEBU, *Bur. Sci. 11078 Ramos*, March, 1912 (type). MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens s. n.*: District of Zamboanga, *Bur. Sci. 15802 Fénix, Merrill 8115, Bur. Sci. 11802 Robinson, Williams 2307*. BASILAN, *Hallier s. n., DeVore & Hoover 41*.

This species has been confused with *Callicarpa caudata* Maxim., and *C. longifolia* Lam., and is manifestly allied to the former, differing in its very different indumentum. It is apparently more closely allied to *C. stenophylla* Merr., than to *C. caudata*, but is distinguished from the former by its broader leaves. Among the extra-Philippine forms it is apparently most closely allied to *Callicarpa longifolia* Lam., differing in its indumentum, shape of its leaves, and in details of its flowers.

CALLICARPA MEGALANTHA sp. nov.

Arbor circiter 10 m alta, omnibus partibus plus minusve dense glandulosis et stellato-plumoso-pubescentibus, indumento obscure fusco vel griseo-fusco; foliis oppositis, oblongo-ovatis, subcoriaceis, acuminatis, integris, basi acutis, usque ad 16 cm longis, nervis utrinque circiter 9, subtus prominentibus; cymis axillaribus, longe pedunculatis, dense multifloris; floribus albis, 6 ad 7 mm longis.

A tree about 10 m high, most parts, except the upper surfaces of adult leaves more or less yellow-glandular and stellate-plumose pubescent, the indumentum dark-brown or dark grayish-brown in color. Branches terete, the younger ones more or less com-

pressed, yellow-glandular, and the younger parts densely stellate-plumose pubescent. Leaves oblong to oblong-ovate, subcoriaceous, entire, 12 to 16 cm long, 5 to 6 cm wide, about equally narrowed to the acute base and to the acuminate apex, the upper surface when young more or less stellate-pubescent, becoming nearly glabrous, brownish-olivaceous, slightly shining, the lower surface paler, with numerous, scattered, pale-yellow, shining glands, densely stellate-pubescent on the midrib and nerves, with scattered stellate hairs on the lamina; lateral nerves about 9 on each side of the midrib, prominent on the lower surface, anastomosing, curved upward; petioles very densely stellate-pubescent, 2 to 2.5 cm long. Cymes in the upper axils, solitary, densely many-flowered, dichotomously branched, 7 to 8 cm in diameter, the peduncles stout, about 8 cm long, the peduncles, branches, bracts, bracteoles, and calyces densely stellate-plumose pubescent, the indumentum almost obscuring the scattered, shining, pale-yellow glands. Flowers white, 6 to 7 mm long, the bracts oblanceolate to spatulate, 6 to 8 mm long, the bracteoles similar but much smaller. Calyx somewhat funnel-shaped, equally 4-lobed, 3 mm long, the lobes short, acute. Corolla 6 to 7 mm long, outside sparingly supplied with small, yellow, shining glands, the lobes 4, subequal, oblong-ovate, broadly rounded, 3 to 3.5 mm long, externally in the median portion sparingly stellate-pubescent as well as glandular. Filaments 7 and 8 mm long; anthers ovoid, 1.2 mm long, somewhat glandular on the back. Ovary ovoid, very densely covered with small, shining, pale-yellow glands.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19687 McGregor*, February, 1913.

Probably most closely allied to *Callicarpa subglandulosa* Elm., but differing from that species in many characters. *Callicarpa megalantha* is remarkable for its comparatively large flowers which are indicated by the collector as being white, a color otherwise unknown or at least very rare in the genus, its long-peduncled cymes, and its dark-brown or dark grayish-brown indumentum.

CLERODENDRON Linnaeus

CLERODENDRON PUBERULUM sp. nov.

Species *C. intermedio* valde affinis, differt omnibus partibus plus minusve puberulis vel pubescentibus.

A suffrutescent, erect, sparingly branched plant 2 m high or less, very similar in appearance to *Clerodentron intermedium* Cham. Older stems glabrous or nearly so, 4-angled, the younger ones distinctly puberulent. Leaves broadly ovate, chartaceous, 10 to 20 cm long, 9 to 17 cm wide, acuminate, base with a

deep, wide sinus, the basal lobes broadly rounded, margins repand-toothed, the upper surface hispid-hirsute with scattered, appressed, stiff hairs, the lower surface densely and softly puberulent, the indumentum nearly obscuring the glands; petioles up to 15 cm in length, puberulent. Panicles terminal, narrowly pyramidal, about 20 cm long, the lower branches about 7 cm long, all parts puberulent, the bracts narrowly spatulate, 1 to 1.5 cm long, the bracteoles linear or subfiliform, short. Flowers numerous, red, their pedicels slender, 1 to 1.5 cm long. Calyx-lobes pubescent, oblong, obtuse, somewhat unequal, about 3 mm long, accrescent in fruit and 5 to 6 mm long. Corolla-tube slender, about 12 mm long, 1 mm in diameter, slightly enlarged above, sparingly pubescent externally, the lobes somewhat unequal, oblong to oblong-obovate, obtuse or rounded, 5 to 7 mm long. Filaments slender, the exserted parts about 2 cm in length. Fruit about 5 mm long, 8 mm wide, depressed-globose, of 2 to 4, 1-seeded pyrenes.

MINDANAO, District of Davao, Davao, in open wet places, *Copeland, 404* (type), March 9, 1904, *DeVore & Hoover 177*, April, 1903.

A species manifestly very closely allied to *Clerodendron intermedium* Cham., which it greatly resembles in aspect. The chief differences appear to be in the indumentum, *C. intermedium* Cham. being entirely glabrous, the present species rather densely puberulent and pubescent.

PREMNA Linnaeus

PREMNA AREOLATA sp. nov. § *Gumira.*

Frutex scandens, inflorescentiis exceptis glaber; foliis oblongis, usque ad 14 cm longis, chartaceis ad subcoriaceis, nitidis, integris, breviter acuminatis, basi acutis ad rotundatis, subtus dense areolatis, nervis utrinque circiter 6; inflorescentiis terminalibus, brunneo-puberulis, multifloris; floribus 4-meris, parvis, calycibus obsolete 4-dentatis, corollae lobis late rotundatis, subaequalibus.

A scandent shrub, glabrous except the inflorescence, the branches terete, grayish, somewhat lenticellate, the younger ones dark-colored when dry. Leaves chartaceous to submembranaceous, oblong, entire, 8 to 14 cm long, 3 to 5 cm wide, the apex shortly acuminate, the base acute to rounded, olivaceous or somewhat brownish when dry, shining, of about the same color on both surfaces or the lower one a little paler, the lower surface very densely areolate, the areolae small, 1 mm or less in diameter, each enclosed by the ultimate reticulations; lateral nerves about 6 on each side of the midrib, slender, rather distinct, somewhat ascending, anastomosing; petioles 1 to 2 cm long. Inflorescence terminal, many flowered, usually peduncled, up to

10 cm long and wide, the rachis, branches, branchlets, and bracts rather densely brown-puberulent, the bracts lanceolate, the largest ones 5 mm long or less. Flowers 4-merous, white or nearly so, cymose, sessile. Calyx somewhat puberulent, 2 mm long, truncate, obsoletely 2-toothed. Corolla-tube glabrous externally, about 2.5 mm long, throat and upper part of the tube inside densely villous, the lobes 4, subequal, broadly ovate, rounded, about 1.4 mm long. Filaments slender, 2 to 2.5 mm long. Style slender, glabrous, 3 mm long, the arms slender, nearly 1 mm in length.

BASILAN, *Bur. Sci. 16179 Reillo*, September 6, 1912 (type). MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens 604*, September, 1906. Said by Mrs. Clemens to be a vine reaching a length of from 75 to 100 feet, growing in large *Ficus* trees.

The species is a very characteristic one, distinguishable by its oblong leaves which are densely areolate on the lower surface, its scandent habit, and its brown-puberulent inflorescence.

PREMNA WILLIAMSII sp. nov. § *Gumira*.

Species *P. areolatae* affinis, differt foliis subtus haud areolatis, basi semper acutis, apice acute acuminatis, nervis utrinque 5, petiolo longioribus, floribus paullo majoribus.

A scandent shrub, glabrous except the inflorescence. Branches terete, gray or brownish, somewhat lenticellate, the younger ones scarcely darker in color than the mature ones. Leaves oblong, chartaceous, entire, shining, of the same color on both surfaces, 8 to 14 cm long, 3 to 5 cm wide, narrowed below to the acute base, the apex sharply acuminate; lateral nerves 5 on each side of the midrib, curved-ascending, distinct; petioles up to 3 cm in length. Inflorescence terminal, cymose, brown-puberulent up to 8 cm long and wide, many-flowered. Flowers 4-merous. Calyx cup-shaped, very obscurely puberulent or nearly glabrous, somewhat 4-angled, 2.2 mm long, truncate, obscurely and broadly 4-toothed. Corolla-tube 3 mm long, glabrous externally, inside in the upper part and the throat densely villous, subequally 4-lobed, the lobes broadly ovate, rounded, about 1.5 mm long. Style slender, glabrous, 5 mm long, the arms about 1 mm in length.

MINDANAO, District of Zamboanga, Sax River, *Williams 2330*, the stems trailing, reaching a diameter of 5 cm, flowers white.

Manifestly very closely allied to the preceding species which it greatly resembles. The leaves, however, are not at all areolate on the lower surface, the petioles are longer, nerves fewer, and the flowers slightly larger.

GESNERIACEAE

CYRTANDRA Forster

CYRTANDRA ATROPURPUREA sp. nov. § *Aureae.*

Frutex erectus, simplex, circiter 2 m altus; foliis confertis, oblongi-obovatis, usque ad 30 cm longis, sessilibus, coriaceis, grosse irregulariter serratis, acuminatis, basi valde angustatis, in siccitate atropurpureis, subtus ad costa nervisque adpresse pubescentibus, nervis utrinque circiter 13, prominentibus; inflorescentiis axillaribus, pedunculatis, bracteis numerosis, oblongo-ellipticis, usque ad 5 cm longis.

An erect, unbranched shrub about 2 m high, the stems stout, the leaves more or less crowded near the summit. Leaves oblong-obovate, 25 to 30 cm long, about 10 cm wide, sessile, coriaceous, the apex shortly and rather sharply acuminate, the base much narrowed, the lower 2 to 4 cm 2 cm wide or less, the margins coarsely serrate, the larger teeth corresponding to the ends of the lateral nerves and up to 6 mm long, with intermediate similar but smaller teeth, the upper surface dark-colored when dry, smooth, somewhat shining, the lower surface when fresh red, when dry dark-purple, the midrib, lateral nerves, and primary reticulations on the lower surface rather densely ferruginous-pubescent with appressed hairs; lateral nerves about 13 on each side of the midrib, anastomosing, curved-ascending, very prominent on the lower surface, the reticulations lax. Inflorescence axillary, the peduncles stout, up to 2 cm long, furfuraceous-pubescent, bearing at their apices numerous, crowded, large bracts and apparently numerous, crowded flowers, the bracts mostly elliptic-oblong to ovate-elliptic, narrowed at both ends, membranaceous or chartaceous 2.5 to 5 cm long, rather prominently nerved, acuminate, coarsely toothed, the nerves more or less pubescent. Flowers not seen. Capsules narrowly ellipsoid, about 12 mm long, narrowed above, glabrous, their pedicels about 5 mm long.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19852 McGregor*, February 2, 1913.

A species manifestly allied to *Cyrtandra rex* Kränzl., from which it is at once distinguished by its colored leaves; from other Philippine species in this group such as *Cyrtandra cumingii* Clarke, *C. oblongata* Merr., *C. alnifolia* Kränzl., etc., it differs in its sessile leaves.

CYRTANDRA FERRUGINEA sp. nov. § *Cuneatae?*

Frutex erectus, omnibus partibus plus minusve dense ferrugineo-pubescentibus; foliis oppositis, longe petiolatis, oblongis ad

oblongo-ellipticis, usque ad 20 cm longis, inaequilateralibus, plus minusve falcatis, acutis vel leviter acuminatis, margine denticulatis, basi acutis vel subrotundatis, nervis utrinque circiter 10; inflorescentiis axillaribus, 1- ad 3-floris, usque ad 5 cm longis, bracteis lanceolatis, liberis; floribus 4 cm longis, calycibus persistentibus, lobis lanceolatis, acuminatis, quam tubo paullo brevioribus.

An erect shrub or suffrutescent plant apparently sparingly branched, all parts more or less densely covered with pale-ferruginous, weak, shining hairs, the younger parts very densely pubescent. Branches terete, or somewhat compressed when dry. Leaves opposite, in somewhat unequal pairs, chartaceous, oblong to oblong-elliptic, 12 to 20 cm long, 2 to 12 cm wide, inequilateral, somewhat falcate, apex acute or slightly acuminate, margins distantly denticulate, base acute or rounded, very inequilateral, the lamina blunt or usually rounded and extending farther on one side than on the other which is acute; lateral nerves about 10 on each side of the midrib; petioles 4 to 7 cm long, those of the smaller leaves of each pair shorter than those of the larger ones. Inflorescence axillary, solitary, few-flowered, 5 cm long or less, the flowers 1 to 3; bracts few, lanceolate, acuminate, free, 1 cm long. Calyx in anthesis 1.5 cm long, in fruit 2 cm long, persistent, the lobes 5, lanceolate, acuminate, somewhat shorter than the tube, the pedicels 1 to 1.5 cm long. Corolla white, 4 cm long, the tube narrow, the lobes rounded. Fruit lanceolate, including the persistent slender style about 3 cm long, slightly pubescent, the fruit proper about as long as the calyx, the style exserted.

LUZON, Province of Camarines, Mount Cauayan, *Phil. Pl. 1548 Ramos*, December 9, 1913.

Not closely allied to any Philippine form known to me, well characterized by its rather uniformly dense ferruginous pubescence, its opposite inequilateral leaves, few flowers, narrow free bracts, and persistent calyces.

CYRTANDRA KRÄNZLINII sp. nov. § *Campanulaceae* ?

Suffrutex erectus vel adscendentibus, simplex, usque ad 50 cm altus, plus minusve ferrugineo-villosus; foliis oppositis, crenatis, in paribus valde inaequalibus, majoribus oblongo-obovatis, apice rotundatis, usque ad 18 cm longis, minoribus subellipticis, 1.5 ad 4 cm longis; floribus axillaribus, solitariis, longe pedicellatis, albis, circiter 5 cm longis, anguste campanulatis.

An erect or ascending undershrub, simple, 30 to 50 cm high, the stems, petioles, lower surfaces of the leaves on the midrib and lateral nerves densely covered with long, weak, ferruginous, jointed hairs. Leaves opposite, firmly chartaceous, slightly cre-

nate, the upper surface glabrous, dark-olivaceous, the lower much paler, in very unequal pairs; larger leaf of each pair oblong-obovate, 12 to 18 cm long, 5 to 8 cm wide, the apex usually broadly rounded, narrowed below to the acute or obtuse, usually strongly inequilateral base; primary lateral nerves about 7 on each side of the midrib, prominent on the lower surface, irregular, the reticulations lax; petioles densely villous, 12 mm long or less: smaller leaves of each pair mostly elliptic, 1.5 to 4 cm long, 0.8 to 2 cm wide, shortly petioled, slightly acuminate. Flowers white, axillary, solitary, ebracteolate, the pedicels densely villous, slender, about 2 cm long. Calyx 2 cm long, subpersistent, narrowly campanulate, villous-pubescent with scattered, long, ferruginous, jointed hairs, the lobes ovate-lanceolate, slenderly caudate-acuminate, about 8 mm long. Corolla narrowly tubular-campanulate, white, about 5 cm long, slightly pubescent externally, the tube (flattened) about 4 mm wide for the lower 1.5 cm, then gradually widened and about 2 cm wide at the throat, the lobes broadly rounded, comparatively short. Disk glabrous, truncate, 2 mm high. Stamens included, the filaments of both the fertile stamens and the staminodes somewhat spirally twisted; anthers narrowly oblong, 3 mm long. Ovary puberulent; style somewhat hirsute; stigma obliquely oblong, 3 mm long. Capsule (immature) cylindric, about 3 cm long, 3.5 mm in diameter, rostrate, rugose, surrounded at the base by the persistent calyx.

PALAWAN, Malampaya Bay, Binaloan, *Merrill 7247*, September, 1910, in forests at sea level, on damp shaded banks.

A very characteristic species, distinguished by its very unequal leaves, its villous, ferruginous indumentum, and its solitary, axillary, long-pedicelled, comparatively large flowers. The flowers are frequently borne in the axils of fallen leaves slightly above the surface of the ground.

CYRTANDRA LONGIPEDUNCULATA sp. nov. § *Polynesiae*.

Frutex subglaber, ramulis junioribus inflorescentiisque parce pubescentibus; foliis oppositis, lanceolatis ad oblongo-oblanceolatis, in paribus leviter inaequalibus, usque ad 10 cm longis, glabris, acuminatis, basi acutis, margine distanter serratis vel denticulatis, nervis utrinque 5 vel 6, prominentibus; inflorescentiis axillaribus, solitariis, umbellatis, paucifloris, laxis, quam folia brevioribus, longe graciliterque pedunculatis; floribus albis, circiter 1.8 cm longis.

An erect shrub, glabrous except the younger branchlets and the inflorescence. Branches and branchlets slender, light-gray, terete, or when dry more or less ridged or striate, the younger parts minutely pubescent with short, brown, appressed hairs.

Leaves opposite, in somewhat unequal pairs, chartaceous or subcoriaceous, lanceolate to oblong-oblanceolate, 4 to 10 cm long, 1 to 3 cm wide, narrowed above to the rather long-acuminate apex and below to the acute or cuneate base, the margins distantly and coarsely serrate to merely denticulate, the upper surface smooth, shining, brownish-olivaceous, the lower paler, often brownish, when young somewhat pubescent, becoming entirely glabrous; lateral nerves 5 or 6 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations lax, prominent; petioles of the larger leaves about 5 mm long, of the smaller ones somewhat shorter. Inflorescence very slender, axillary, solitary, few-flowered, shorter than the leaves, the flowers umbellately disposed at the apices of the simple peduncles. Peduncles very slender, 3.5 to 5.5 cm long, the bracts lanceolate, 4 mm long, the pedicels 1 to 1.5 cm long. Flowers few, white, but one or two opening at the same time in each umbel. Calyx 6 mm long, glabrous or nearly so, ovoid, the tube 3 mm long, the lobes ovate-lanceolate, 3-nerved, long-acuminate, more or less spreading, about 3 mm long. Corolla glabrous, narrowly campanulate, about 1.8 cm long, slightly widened upward, 2-lipped, the upper lip with 2, broadly ovate, rounded lobes about 3 mm long, the lower lip with 3 lobes, similar to those of the upper lip but slightly larger. Disk cupular, truncate, glabrous, 2 mm high. Stamens 2; filaments slightly pubescent; anthers 1 mm long, connate. Ovary narrowly ovoid, glabrous, tapering upward into the style which is glabrous below, and pubescent in the upper one-half or two-thirds.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19664* (type), *19796 McGregor*, February 8, 1913.

A species similar to and manifestly closely allied to *Cyrtandra plectranthiflora* Kränzl., from which it differs in its differently shaped, glabrous, smaller, fewer-nerved leaves and its larger flowers.

CYRTANDRA OBLONGATA sp. nov. § *Aureae*.

Frutex erectus, 2 ad 3 m altus, plus minusve pubescentibus; foliis oblongis, coriaceis, usque ad 25 cm longis, acuminatis, base longe angusteque decurrentibus, margine irregulariter serratis, supra glabris, subtus dense ferrugineo-pubescentibus; nervis utrinque 14 ad 16, adscendentibus, subtus valde prominentibus; inflorescentiis axillaribus, sessilibus, floribus confertis, circiter 3 cm longis, bracteis involucrantibus albis, usque ad 3 cm longis, anguste obovatis vel elliptico-ovatis.

An erect, more or less branched shrub 2 to 3 m high, the branches stout, terete, or the younger ones more or less angled.

Leaves somewhat crowded toward the ends of the branchlets, oblong, coriaceous, 18 to 25 cm long, 4 to 8 cm wide, the upper surface glabrous, dark-olivaceous, smooth, the lower much paler, the apex shortly but sharply acuminate, the base long and narrowly decurrent, winging the stout, 3 to 6 cm long petiole, the margins rather coarsely and irregularly serrate; nerves 14 to 16 on each side of the midrib, curved-ascending, very prominent on the lower surface, and with the midrib and the primary reticulations densely lanate-pubescent with brown hairs. Inflorescence axillary, sessile, the flowers crowded, shortly pedicelled, subtended by an involucre of large bracts. Bracts numerous, white, narrowly obovate to ovate-elliptic, membranaceous, up to 3 cm long and 2 cm wide, acuminate, coarsely toothed, sessile, prominently veined, the reticulations lax, slightly pubescent. Calyx about 18 cm long, outside appressed ferruginous-lanate, the upper 1 cm divided into 5, ovate-lanceolate, long and slenderly acuminate lobes. Corolla white, narrowly campanulate, 3 cm long, the two lobes of the upper lip about 6 mm long, orbicular-ovate, rounded, the cleft between them narrow, 5 mm deep, the three lobes of the lower lip broadly ovate, rounded, about 10 mm long. Stamens 4; anthers about 2.5 mm long. Ovary narrowly ovoid, glabrous, 4 to 5 mm long; style pubescent below the stigma. Capsule narrowly ellipsoid, about 12 mm long.

LUZON, Provinces of Tayabas and Laguna, Mount Banajao, *Merrill 7515* (type), February, 1911, *Whitford 931, 1008*, October, 1904: without definite locality, *Loher 6650*. *Merrill 5578*, from Mount Halcon, Mindoro, a very poor specimen, is also apparently referable here.

This species has previously been confused with *Cyrtandra cumingii* Clarke, to which it is allied, but from which it differs in many characters, the shape and pubescense of its leaves, and the elongated, narrowly winged petioles. It is apparently closer to *Cyrtandra rex* Kränzl. than to *C. cumingii* Clarke, but is very different from Kränzlin's species.

CYRTANDRA NANA sp. nov. § *Brevicaules*.

Planta parva, glabra, erecta, simplex, circiter 4 cm alta; foliis oppositis et ternis, sessilibus, oblongis, chartaceis, acutis, serratis, aequalibus, circiter 2 cm longis, 4 mm latis; floribus axillaribus, solitariis, circiter 1 cm longis, calycibus alte 5-partitis.

A small, glabrous, erect, unbranched plant about 4 cm high. Leaves rather crowded, the internodes short, mostly ternate or some opposite, equal, sessile, chartaceous, oblong, about 2 cm long, 4 mm wide, acute, base narrowed-decurrent, margins sharply serrate, the nerves obscure. Flowers apparently pur-

plish, solitary, axillary, their pedicels about 7 mm long, the bracts small or wanting. Calyx divided nearly to the base into 5, linear-oblong, obtuse lobes, the lobes about 6 mm long, 0.7 mm wide. Corolla narrowly funnel-shaped, somewhat enlarged upward, obscurely 2-lipped, the lobes broadly rounded, quite glabrous, 1 cm long. Ovary narrowly oblong, glabrous, 1.5 mm long, narrowed upward into the 5 mm long style. Stamens included, the staminodes inserted higher up than the stamens.

MINDANAO, Bukidnon Subprovince, near Tangcolan, *Bur. Sci. 21462 Escritor*, August 2, 1913.

A species well characterized by its very small size, the entire plant not exceeding 4 cm in height. Other striking characters are its solitary, pedicelled flowers, and its sessile ternate and opposite sessile leaves.

DICHROTRICHUM Reinwardt

DICHROTRICHUM PAUCIFLORUM sp. nov.

Suffrutex epiphyticus, scandens, plus minusve setoso-hirsutus; foliis longe petiolatis, ellipticis, usque ad 13 cm longis, 7 cm latis, basi acutis, apice breviter obtuse acuminatis, nervis utrinque circiter 7; inflorescentiis axillaribus, brevibus, paucifloris; floribus circiter 3 cm longis, extus setoso-hirsutis.

An epiphytic, sparingly branched suffrutescent vine, the stems terete, somewhat fleshy when fresh, glabrous, emitting numerous roots along the side next to the supporting plant, glabrous, light-gray when dry, the apical parts more or less setose-hirsute. Leaves elliptic, 10 to 13 cm long, 5.5 to 7 cm wide, chartaceous, olivaceous, the base acute, the apex shortly and obtusely acuminate, margins irregularly and doubly toothed, the teeth small, both surfaces with more or less scattered, long, stiff, white, jointed, setose-hirsute hairs especially along the midrib and lateral nerves, similar hairs also on the petioles and the inflorescence; lateral nerves about 7 on each side of the midrib, rather prominent on the lower surface, curved-ascending; petioles 4 to 6 cm long, when young densely setose-hirsute, less so when old. Inflorescence axillary, few-flowered, setose-hirsute, including the prominent flowers 4 cm long or less, the flowers subfascicled or arranged on a very short peduncle. Flowers up to 5 in each axil, but one or two opening at the same time, red, their pedicels 3 to 4 mm long, setose. Sepals 5, oblong-obovate to oblong-oblanceolate, 1.2 to 1.5 cm long, 3 to 4 mm wide, obtuse or acute, irregularly and rather prominently toothed, dorsally setose-hirsute with long stiff hairs. Corolla about 3 cm long, somewhat curved, externally somewhat setose-hirsute, the mouth very oblique, lobes broadly rounded. Fila-

ments exserted 6 to 10 mm. Ovary glabrous; style spatulate. Disk prominent, glabrous, about 1.5 mm in diameter.

PALAWAN, Mount Capoas, Malampaya Bay, *Merrill 9497*, April 21, 1913, epiphytic in the mossy forest, altitude about 950 meters.

A species readily distinguished by its very short inflorescence, in this character approaching *D. asperifolium* Benth. & Hook. f., and *D. brevipes* Clarke, from both of which, however, it is very distinct.

TRICHOSPORUM D. Don

TRICHOSPORUM BRACHYSEPALUM sp. nov.

Frutex epiphyticus, scandens, glaber, tenuibus; foliis oppositis, coriaceis, oblongo-lanceolatis, usque ad 8 cm longis, acuminatis, nervis lateralibus obsoletis; floribus axillaribus, solitariis, pedicellatis, calycis usque ad basin divisi, segmentis 2 mm longis; corolla 2.2 cm longa, curvata, staminibus exsertis, filamentis pubescentibus.

An epiphytic, glabrous, slender, branched vine, the stems and branches rather slender, terete, light-gray, the branchlets often longitudinally sulcate or striate when dry. Leaves opposite, oblong-lanceolate, fleshy when fresh, coriaceous and wrinkled when dry, 6 to 8 cm long, 1.5 to 2 cm wide, narrowed below to the acute base, and above to the sharply and usually slenderly acuminate apex, the lateral nerves obsolete or nearly so; petioles 2 to 5 mm long. Flowers axillary, solitary, their pedicels slender, glabrous, about 1 cm long. Calyx consisting of 5, small, ovate-lanceolate, acuminate, 2 mm long, glabrous lobes. Corolla tubular, curved, base broadly rounded, glabrous, 2 to 2.2 cm long, about 4.5 mm in diameter, the throat somewhat oblique, limb 2-lipped, 2 lobes somewhat larger than the other 3, the lobes orbicular, rounded, about 4 mm in diameter, their margins with few, scattered, stiff hairs. Disk glabrous, truncate, 0.5 mm in diameter. Ovary glabrous; style pubescent. Stamens exserted about 1 cm; filaments pubescent; anthers connate, about 2 mm long.

BASILAN, Cumalarang, *Bur. Sci. 16163 Reillo*, August 25, 1912.

A species well characterized by its greatly reduced calyx which consists merely of 5, ovate-lanceolate, acuminate, 2 mm long lobes.

TRICHOSPORUM MACGREGORII sp. nov. § *Haplotrichium.*

Species *T. rizalense* affinis, differt floribus majoribus, 3.5 cm longis, corolla deorsum haud angustata, lobis majoribus (circiter 6 mm diametro), foliis tenuiter acuminatis.

An epiphytic vine, glabrous except the inflorescence, the branches light-gray, terete, the branchlets slender. Leaves

oblong-ovate to ovate-lanceolate, chartaceous or subcoriaceous when dry, usually olivaceous, 3.5 to 5 cm long, 1.3 to 1.6 cm wide, the base acute, the apex slenderly and sharply acuminate; lateral nerves 3 or 4 on each side of the midrib, ascending, very slender, often obscure; petioles about 2 mm long. Flowers solitary, axillary, their pedicels rather densely hirsute, about 6 mm long. Calyx cleft to the base into 5, narrowly lanceolate, acuminate or blunt lobes which are somewhat hirsute, about 7 mm long, 1.2 mm wide, 3-nerved. Corolla red, somewhat curved and ventricose, 3.5 cm long, hirsute outside, the mouth somewhat oblique, the lower 3 lobes broadly ovate, rounded, about 6 mm in diameter, the upper two about 4 mm in diameter. Disk glabrous, truncate, about 2 mm long. Ovary glabrous; style hirsute. Anthers 2 mm long, connate, included, the filaments as long as the corolla-tube.

LUZON, Province of Nueva Vizcaya, near Imugan, *Bur. Sci. 20075 McGregor*, January, 1913.

Manifestly closely allied to *Trichosporum rizalense*, which it closely resembles, differing in the indicated floral and vegetative characters.

TRICHOSPORUM RIZALENSE sp. nov. § *Haplotrichium.*

Species *T. philippinense* simillima et affinis, differt floribus majoribus, circiter 3 cm longis, extus parce hirsutis, nervis lateralibus vix obsoletis, tenuibus, adscendentibus.

A scandent, slender, epiphyte, glabrous except the inflorescence. Branches and branchlets slender, terete, mostly light gray. Leaves opposite, when fresh fleshy, when dry coriaceous, elliptic-ovate, 3.5 to 4 cm long, 1.5 to 2 cm wide, the base acute, the apex acute or slightly acuminate, rather pale when dry; lateral nerves slender, ascending, about 4 on each side of the midrib, sometimes indistinct; petioles about 3 mm long. Flowers solitary, axillary, their pedicels slender, hirsute, 5 to 6 mm long. Calyx cleft to the base into 5, lanceolate, obtuse, 3-nerved lobes 5 to 6 mm long, about 1.4 mm wide, sparingly hirsute. Corolla red, somewhat curved, 3 cm long, sparingly hirsute outside, narrowed below, the mouth somewhat oblique, 2-lipped, lobes of the upper lip broadly rounded-ovate, about 4 mm in diameter, of the lower lip about 5 mm in diameter. Disk glabrous, truncate, 1.5 mm long. Ovary glabrous; style hirsute. Anthers included, connate in pairs, 2 mm long, the filaments as long as the corolla.

LUZON, Province of Rizal, Mount Canumay, *Bur. Sci. 13775 Ramos*, October, 1911.

In general appearance greatly resembling *Trichosporum philippinense*, differing however, among other characters, in its larger hirsute flowers.

TRICHOSPORUM MALINDANGENSE sp. nov. § *Haplotrichium* ?

Frutex epiphyticus, scandens, gracile, inflorescentiis exceptis glaber; foliis coriaceis, anguste lanceolatis vel oblongis, glabris, circiter 7 cm longis, integris, nervis lateralibus obsoletis; calycibus tubulosis, breviter dentatis, extus parce capitellato-hirsutis, 2 ad 2.5 cm longis; corolla 4 cm longa, cylindrica, extus parce hirsuta.

An epiphytic, scandent shrub, the branches rather stout, terete, pale-brown when dry, very slightly pubescent or subglabrous. Leaves opposite, lanceolate to narrowly oblong, thickly coriaceous, pale and more or less wrinkled when dry, 6 to 7 cm long, 1.5 to 2 cm wide, narrowed above to the blunt apex, the base acute, somewhat shining, the midrib prominent, the nerves and reticulations obsolete; petioles 5 to 7 mm long. Flowers axillary, the pedicels 6 to 8 mm long, solitary or 2 to 4 fascicled in the upper axils. Calyx tubular, 2 to 2.5 cm long, 6 to 8 mm in diameter, slightly inflated in the middle, 5-toothed, the teeth short, acute, outside with scattered, short, white, capitate hairs. Corolla red, about 4 cm long, narrowly tubular, the limb somewhat spreading, irregularly 5-lobed, the lobes ovate, rounded, about 6 mm in diameter. Stamens 4, included or slightly exserted; anthers about 3 mm long. Disk glabrous. Ovary nearly as long as the corolla, rather densely capitellate-hirsute.

MINDANAO, Province of Misamis, Mount Malindang, *For. Bur. 4660 Mearns & Hutchinson*, May, 1906, in forests, altitude about 1,000 m.

TRICHOSPORUM MINDORENSE sp. nov. § *Haplotrichium.*

Species *T. philippinense* affinis, differt pedunculis unifloris, floribus brevioribus latioribusque, circiter 2 cm longis,

An epiphytic, scandent shrub, quite glabrous, the branches slender, terete, light-gray, 2 to 3 mm in diameter. Leaves fleshy when fresh, when dry coriaceous, pale-brownish, dull or slightly shining, oblong-ovate to oblong-lanceolate, 4 to 6 cm long, 1.5 to 2 cm wide, entire, the base acute, the apex long and slenderly subcaudate-acuminate, the midrib distinct, the lateral nerves and reticulations obsolete; petioles about 2 mm long. Flowers scarlet, axillary, solitary, their pedicels about 1 cm long, jointed in the middle, with a pair of linear, obtuse, 4 mm long bracts near the joint. Calyx cleft to its base into linear, obtuse, 4 to 5 mm lobes. Corolla scarlet, 2 cm long, glabrous, slightly curved, when flattened about 1 cm wide at the throat, somewhat ventricose, the mouth somewhat oblique, not contracted, the three lower lobes rounded-reniform, about 7 mm in diameter. Stamens

included; anthers connate in pairs, 2 mm long. Disk 2 mm high, truncate, about 1.5 mm in diameter.

MINDORO, Mount Halcon, *Merrill 6141*, November, 1906 (type), *For. Bur. 4379 Merritt*, June, 1906, altitude about 1,300 m; Mount Sablayan, *For. Bur. 9761 Merritt*, March, 1908, altitude about 1,000 m.

A species manifestly allied to *Trichosporum philippinense* O. Ktze., with which the three specimens above cited have previously been confused, and which they greatly resemble, especially in vegetative characters. The flowers, however, are very different, relatively much shorter and broader, while the peduncles bear but a single flower, both the peduncles and pedicels being longer in the present species than in *T. philippinense* O. Ktze.

TRICHOSPORUM IRIGAENSE sp. nov.

Frutex epiphyticus, glaber, ramulis teretibus; foliis oppositis, petiolatis, coriaceis, oblongo-lanceolatis vel ovato-lanceolatis, nitidis, usque ad 9 cm longis, basi acutis, apice longe tenuiterque acuminatis, nervis lateralibus numerosis, densis, tenuibus, adscendentibus; floribus axillaribus, solitariis, pedicellatis, circiter 3 cm longis; sepalis oblongis, acutis, circiter 1 cm longis, 3 ad 4 mm latis; corolla glabra, leviter inflata, plus minusve curvata.

An epiphytic plant, sparingly branched, quite glabrous, the branches terete, apparently somewhat fleshy, when dry 2 to 3 mm in diameter. Leaves opposite, coriaceous, oblong-lanceolate to ovate-lanceolate, 6 to 9 cm long, 2 to 3 cm wide, base acute or somewhat rounded, apex long and slenderly acuminate, straight or slightly falcate, the upper surface olivaceous, shining, the lower paler; lateral nerves 10 or more on each side of the midrib, slender, densely arranged, sharply ascending, about equally evident on both surfaces; petioles 10 to 12 mm long. Flowers axillary, solitary, apparently red, quite glabrous, about 3 cm long, their pedicels about as long as the petioles. Calyx lobes nearly free, oblong, acute or obtuse, about 1 cm long, 3 to 4 mm wide, narrowed at both ends. Corolla somewhat inflated, slightly curved, when flattened out about 7 mm in diameter, enlarged upward.

LUZON, Province of Camarines, Mount Iriga, on trees at the summit, altitude about 1,200 m, *Bur. Sci. 22211 Ramos*, December 3, 1913.

The alliance of this species seems to be with TRICHOSPORUM FOXWORTHYI (Kränzl.) *Aeschynanthus foxworthyi* (Kränzl.), but is sufficiently distinct. The slender ascending nerves are characteristic.

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CHAMPIGNONS DES PHILIPPINES COMMUNIQUÉS PAR C. F. BAKER, II[1]

Par N. PATOUILLARD
(*Neuilly-sur-Seine, France*)

BASIDIOMYCETES

A. HÉTÉROBASIDIÉS

SEPTOBASIDIUM Patouillard

SEPTOBASIDIUM LAXUM sp. nov.

Resupinatum, longe lateque effusum, arcte adnatum; subiculo tenui, cinereo, ambitu fimbriato, concolori; contextu laxo, ex hyphis erectis, fasciculatis, brunneis, 4–6 μ crassis, septatis, sursum ramosis, apice acutis, fasciculis rigidis, 15–40 μ crassis, distantibus, 1–2 mm altis composito; hymenio superficiali, frustuloso, pelliculoso, fusco-purpureo, evanescenti; probasidiis breviter pedicellatis, e globoso ovoideis, 15–20 μ diam., brunneis, crassiuscule tunicatis, persistentibus; basidiis hyalinis, vehementer curvatis, apice obtusis, transverse triseptatis, 35–40$\times$10 μ, tristerigmaticis; sporis.....

Mont Maquiling prés Los Baños, Prov. Laguna,[2] *Nemesio Catalan*, comm. *Baker 2978*. Sur les Coccides des tiges *d'Astronia Cumingiana*.

Plante voisine de *S. Thwaitesii* et de *S. pedicellatum*, caractérisée par un subiculum gris cendré, très adhérent au support, par ses fascicules fibreux très distants et par sa pellicule hymenienne d'un roux pourpre très sombre.

Les probasides à parois épaisses persistent sur leur support après la chute des basides et présentent alors une ouverture apicale, exactement

[1] Cfr. Patouillard in Elm. Leafl. Philip. Bot. 6 (1914) 2239–2256.

[2] The specimens cited in this paper are all from the Island of Luzon. E. D. M.

comme chez les *Uromyces*. Par fois elles germant sans donner de sporophore, mais un simple filament mycelien, continu ou pourvu de nombreuses cloisons transversales.

SEPTOBASIDIUM sp. dub.

Los Baños, Prov. Laguna, *Baker 2389*. Sur les coccides des feuilles du *Celtis luzonensis*. Forme jeune, inévoluée.

AURICULARIA Bulliard

AURICULARIA POLYTRICHA (Mtg.) Sacc.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2240.

Los Baños, Prov. Laguna, *Baker 2534*. Sur bois pourri.

AURICULARIA TENUIS Lév.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2240.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2520, 3389*. Sur le bois mort.

AURICULARIA RUGOSISSIMA (Lév.) Bres. in Hedwigia 53: 78; *Phlebia rugosissima* Lév. Champ. exot. 214; *Phlebia reflexa* Berk. in Journ. Bot. (1845) no. 345.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2527, 2612*. Sur bois mort.

HETEROCHAETE Patouillard

HETEROCHAETE TENUICULA (Lév.) Pat.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2240.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2743, 2902*. Sur branches mortes de *Ficus hauili*, sur les petits rameaux tombés, etc.

B. HOMOBASIDIÉS

HYMENOCHAETE Léveillé

HYMENOCHAETE PAVONIA sp. nov.

Pileo imbricato, sessili, dimidiato, semiorbiculari, tenuissime papyrino, flexili, plano, glabriusculo, subnitenti, postice castaneo-brunneo, antice rufo-spadiceo, 1–5 cm diam., zonis sulcatulisve densissimis concoloribus notato; contextu tenui (vix 0.5 mm), rufo, compacto, hyphis pallide flavis, 2–3 μ crassis; hymenio plano, levi rufo-spadiceo; setulis (cystidiis) sparsis, rigidis, simplicibus, acutis, rufis, 30$\times$5 μ, vel 15–25$\times$5 μ; sporis stramineis, ellipsoideis, minutis, 3$\times$1.5 μ.

Mont Maquiling, Prov. Laguna, *Baker 2374*. Sur le bois pourri.

L'aspect de ce champignon est le même que celui des *Hymenochaete attenuata, H. Kunzei*, etc., mais il se sépare de tous les similaires par son chapeau glabre et presque brillant. Par ses petites soies il touche à *Stereum luteo-badium* Lév. ap. Zoll. 2093–1204 qui est d'une autre couleur. *Thelephora* (*Stereum*) *pulverulenta* Lév. (*Drege 9442*) du Cap de Bonne Espérance (*Coniophora*, Cooke, Grevillea 8: 89 et Sacc. Syll.) est un *Hymenochaete* du groupe de *H. leprosa, H. laeta, H. Kunzei*, etc., il a des soies rousses, mesurant 23–36$\times$4–5 μ.

DUPORTELLA genus novum

Fungi homobasidiati, lignatiles, aridi, phaeonemei, hymenio infero, levi; paraphysibus coloratis, rigidis, simplicibus, setiformibus, dense fasciculatis; cystidiis immersis; sporis hyalinis. *Stereo* et *Hymenochaete* analogum.

Genre dédié a Mons. L. Dupor, zélé collecteur naturaliste, qui le premier nous communica du Tonquin, des specimens de ce groupe.

DUPORTELLA VELUTINA sp. nov.

Resupinata, arcte adnata, membranacea, tenui, orbiculari dein confluendo late irregulariterque effusa (2–10 cm et ultra), umbrino-fulva, velutina vel strigosa, hinc illinc glabra, albido-cinerea, minute rimosaque, ambitu pallidiori; paraphyses rigidae, fusco-brunneae, 60–75×3–4 μ, obtusae vel acute; cystidia ventricosa, fusiformia, stipitata, subhyalina, tenuiter tunicata, 33–50× 15–25 μ; basidia claviformia, tetraspora (30–35×8×10 μ); sporae hyalinae, rectae, subcylindraceae (9×3 μ).

Los Baños, *Baker 532, 764, 2167; Raimundo*, comm. *Baker 725;* Mont Maquiling, Prov. Laguna, *Evaristo*, comm. *Baker 1183.* Sur les branches mortes: *Tamarindus indica, Gliciridia sepium*, etc.

Ce champignon ressemble à un *Hymenochaete* résupiné, mais sa constitution est tres différente.

Il débute sous l'aspect d'une petite tache orbiculaire, brune, entourée d'un étroit liseré blanchâtre; par confluence, ces taches forment de grandes plaques à contour sinueux. A la loupe elles paraissent veloutées ou même strigueuses.

Dans cet ètat elles sont composées d'un lasci peu épais de filaments serrés et bruns, duquel s'élèvent verticalement des paraphyses rigides, étroites, allongées, à parois épaisses, aiguës ou obtuses au sommet, très abondantes, arrivant toutes à la même hauteur. Ce sont elles qui donnent l'aspect velouté de la surface.

De la partie inférieure de ces paraphyses et en dessous d'une cloison, naissent des cystides incolores, solitaires, stipitées, renflées vers le milieu et atténués en pointe plus on moins effilée, qui s'élévent entre les paraphyses, mais sans faire saillie au dehors. Leur paroi est mince, lisse et leur contenu hyalin est homogène ou granuleux.

Plus tard, lorsque la plante devient fertile, sa surface prend une teinte cendrée et perd son aspect velouté; par la dessication ces parties fertiles se fragmentent par une infinité de petite crevasses.

Les basides claviformes et incolores, portent quatre stérigmates subulés, terminés par une spore hyaline, droite et cylindrique.

Les paraphyses naissent des filaments couchés formant le strome, mais on peut en observer qui prennent leur origine sur le coté de la paroi des cystides, vers la région supérieure de l'organe. En général ces paraphyses accidentelles sont pourvues de plusieurs cloisons transversales, alors que les paraphyses normales ne présentent qu'une cloison unique, située près de leur base, juste au dessus du point d'insertion d'une cystide.

Duportella différe d'*Hymenochaete* par la nature des cystides et par la présence des paraphyses.

DUPORTELLA RAIMUNDOI sp. nov.

Resupinata, adnata, late effusa, velutina, umbrina vel rubro-brunnea, fulvo-marginata, dein glabra, brunneo-cinerea, minute rimosa; paraphyses setiformes, 60–90×3–4 μ; cystidia fusoidea vel subglobosa, 40–45×15–18 μ; sporae.....

Los Baños, Prov. Laguna, *Raimundo*, comm. *Baker 567*. Sur les tiges mortes des bambous.

Très semblable au précédent, mais d'une coloration plus gaie, d'un ocre rouge teinté de brun.

PODOSCYPHA Patouillard

PODOSCYPHA OBLIQUA (Mtg. et Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2241.

Los Baños, Prov. Laguna, *Baker 2525*. Sur souches mortes.

STEREUM Fries

STEREUM SPECTABILE Mey.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2242.

Pauai, Subprov. Benguet, *Copeland*, comm. *Baker 1285;* sommet du Mont Maquiling, Prov. Laguna, *Baker 3448*. Sur branches tombées.

STEREUM LOBATUM Fr. var. **CONCOLOR** Jungh.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2242.

Mont Banahao, Prov. Laguna, *Baker 2251, 2950;* Mont Maquiling, *Baker 3103*. Sur les troncs morts.

STEREUM BORYANUM Fr. Epicr. 547.

Baguio, Subprov. Benguet, *Copeland*, comm. *Baker 1305*. Sur branches mortes.

STEREUM RIMOSUM Berk. in Hook. Journ. (1851) 169.

Los Baños, Prov. Laguna, *Baker 2127*. Sur le bois mort.

STEREUM HIRSUTUM (Willd.) Fr. Epicr. 549; *Thelephora* Willd.; *Auricularia reflexa* Bull.

Los Baños, Prov. Laguna, *Baker 2102;* Mont Banahao, Prov. Laguna, *Baker 2232*. Sur les vieux bois.

CLADODERRIS Persoon

CLADODERRIS DENDRITICA Pers. in Freyc. Voy. *tab. I, fig. 4*.

Los Baños, Prov. Laguna, *Baker 2397, 2521*. Sur les souches.

SISTOTREMA Persoon

SISTOTREMA AUTOCHTON Berk. et Mtg. Dec. Fung. II, No. 14; Zoll. Java No. 390.

Mont Maquiling, Prov. Laguna, *Baker 3039*. Sur troncs morts, à terre.

Pores irréguliers, alvéolés, anguleux, 1–3 mm de diam., parfois lamelleux, peu profonds, sur un subiculum mince, fragile et blanc, qui entoure la portion hymenienne d'une large marge appliquée. Croit sur le bois ou sur la terre.

LEUCOPORUS Quelet

LEUCOPORUS GRAMMOCEPHALUS (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2243.

Los Baños, Prov. Laguna, *Baker 195*. Sur bois pourri.

LEUCOPORUS GRAMMOCEPHALUS (Berk.) var. **TRIGONUS** Lév.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2243.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2524, 2599*. Sur branches mortes.

Spores incolores, elliptiques, 6–7×3 μ. Pores 120–150 μ de diam.

LEUCOPORUS EMERICI Berk. ap. Kalch. in Grevillea 10: 96 (*Polyporus*).

Sommet du Mont Maquiling, Prov. Laguna, *Baker 3405*. Sur troncs morts.

Specimen unique, qui differe de la forme typique par sa coloration ombre foncée. Les pores rayonnants (2–5×2–4), dentés sur la tranche, ressemblent à ceux d'un *Favolus*.

LEUCOPORUS AMEIDES sp. nov.

Coriaceus, pleuropus, macroporus; pileo spathulato, antice orbiculari, postice in stipitem brevem attenuato, obscure cinereo, radiatim striato, striis ramosis, reticulatim anastomosantibus, cristatis, postice exasperatis, antice prostratis, marginem denticulatim excedentibus; pagina inferiori albida, undique fertili; poris magnis, anguloso-hexagonis, favoloideis, dissepimentis rigidis, radiantibus, sublenzitoideis, acutis, laceratisque, usque ad basim stipitis decurrentibus; tubulis 1–2 mm longis, albido-fuscis, pilis fasciculatis (60–75×15 μ) hinc illinc conspersis; contextu albo, ex hyphis 3 μ crassis composito; stipite brevissime, glabro, vix discoideo.

Mont Maquiling, Prov. Laguna, *Baker 2115*. Sur le bois mort.

Plante de 3–4 cm de long, 5 cm de large, épaisse de 4 mm dont 3 pour la longueur des tubes; stipe de 3 mm, couvert de pores et blanc en dessous, gris et rugueux hispide en dessus. Pores mesurant 3–4×2 mm.

Du groupe de *L. grammocephalus*, très proche de *L. Emerici*, cette espèce est caracterisée par sa pellicule d'un gris de souris, formée de fibres saillantes, couchées, anastomosées en un réseau radial à larges mailles, se prolongeant au delà de la marge sous la forme de dents triangulaires aiguës et grises. Les alvéoles portent ça et la de petites touffes incolores de poils accolés, ressemblant à celles d'*Elmerina*.

LEUCOPORUS OBOVATUS Jungh. Java, 76 (*Polyporus*).

Mont Maquiling, Los Baños, Prov. Laguna, *Baker 2116, 2600*. Sur le bois pourri.

Pores très petits, ± 100×60 μ; spores ovoides, incolores, 3×2.5 μ.

LEUCOPORUS GALLO-PAVONIS (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2243.

Mont Maquiling, Los Baños, Prov. Laguna, *Baker 2122, 2531, 2913, 3107, 3201, 3351, 711*.

Très variable dans sa forme; on trouve des spécimens à peu près sessiles, d'autres plus on moins longuement stipités, pleuropodes ou à pied central; dans ce dernier cas, le chapeau est orbiculaire, entier, en entonnoir et élégamment zoné.

LEUCOPORUS VERNICIPES (Berk.) Challenger 3: 50 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 3289, 3349.* Sur les branches tombées.

MELANOPUS Patouillard

MELANOPUS DICTYOPUS (Mtg.) Fl. J. Fernand. No. 14 (*Polyporus*).

Mont Banahao, Prov. Laguna, *Baker 2231.* Sur le bois mort.

MICROPORUS Palisot de Beauvois

MICROPORUS SANGUINEUS (Linn.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244.

Mont Maquiling, Prov. Laguna, *Baker 2497, 3106.* Sur le bois mort.

MICROPORUS XANTHOPUS (Fr.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244.

Mont Maquiling, Prov. Laguna, *Baker 3102, 3105.* Sur troncs pourris.

MICROPORUS LUTEUS (Nées), f. **CASTANEA** Bres. in Hedwigia 53: 61.

Mont Banahao, Prov. Laguna, *Baker 2235.* Sur troncs morts.

MICROPORUS CRENATUS (Berk.) Fungi Mus. Brit. 372 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 2597.* Sur vieux troncs.

MICROPORUS MICROLOMA (Lév.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244.

Mont Banahao, Prov. Laguna; Mont Maquiling, Los Baños, *Baker 2250, 3108, 3110.* Sur les rameaux tombés.

MICROPORUS SQUAMAEFORMIS (Berk. in Hook. Journ. (1852) 139 *Polyporus*); (*Polystictus* Cook. in Grevillea 14: 79; Bres. in Hedwigia 53: 62 et var. *nephelodes* Bres. *loc. cit.* an Lév.?).

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2496, 3100, 3400, 3401.* Sur les branches mortes.

Très variable par la couleur du chapeau et du stipe; on trouve des specimens dans lesquels ces deux parties, ou seulement l'une d'elles, sont brunes ambrés ou noires. Touche a *M. xanthopus* et pourrait être rattache à *M. florideus* comme simple varieté pleuropode.

MICROPORUS AFFINIS (Nees); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244.

Mont Banahao, Prov. Laguna; Mont Maquiling, Los Baños, *Baker 2124, 2249, 3203, 3396, 3399, 3409, 3391, 3199.* Sur branches mortes.

MICROSPORUS AFFINIS (Nees) var. **FASCIATUS** var. nov.

Pileo tenui, fusco, zonis crebris, albo-tomentosis variegato; stipite brevissimo, puberulo, laterali.

Mont Maquiling et Mont Banahao, Prov. Laguna, *Baker 2596, 2948.* Sur le bois mort.

Varieté exactement intermédiaire entre *M. affinis* et *M. flabelliformis;* elle se rattache au premier par son chapeau mince, de couleur chatain, et touche au second par son stipe très court et le tomentum abondant qui recouvre le chapeau et le pied.

LEPTOPORUS Quelet

LEPTOPORUS SANGUINARIUS Klot. in Linn. 8: 484 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 2498.* Sur troncs pourris.

LEPTOPORUS DICHROUS (Fr.) Obs. Myc. 1: 125 (*Polyporus*). Forme résupinée.

Los Baños, Prov. Laguna, *Baker 2745, 2002.* Sur les rameaux morts de *Cratoxylon* et d'*Alchornea rugosa.* Sur *Streblus asper, Raimundo,* comm. *Baker 1860.*

LEPTOPORUS BAKERI sp. nov.

Semi-orbicularis vel cuneiformis, scutatim adfixus aut substipitatus, planus, rigidus, cinereo-ater, velutinus, concentrice zonato-sulcatus, radiatim plicatus, 3–8 cm latus, margine recto, fusco, intus lignicolor, fibrosus, induratus; hymenium carneum; pori minuti, angulosi; tubuli brevissimi, carnoso-subgelatinosi; cystidia nulla.

Mont Maquiling, Prov. Laguna, *Baker 3387, 3325.* Sur troncs morts.

Plante solitaire ou imbriquée, charnue puis dure, à hymenium exactement semblable à celui de *L. dichrous,* bien distincte par la coloration noiratre de la face supérieure du chapeau.

LEPTOPORUS RUGULOSUS (Lév.) Champ. exot. 189 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 3352.* Sur souches pourries.

LEPTOPORUS ARMATUS sp. nov.

Pileo carnoso-coriaceo, conchiformi, in stipitem attenuato, exsicatione contracto induratoque, tenui, 5 cm longo, convexo, cinereo-rufescenti, velutino, concentrice sulcato, antice crebre zonato, postice rugoso, undique aculeato, aculeis brevibus, obtusis, rigidis, erectis; stipite rufo, glabro, subvernicoso, circulatim dense sulcatulo; hymenio *purpureo* dein atro-brunneo; poris minutis (± 100 μ), dissepimentis tenuibus, obtusis, integris; tubulis circiter 2 mm longis, rufidulis; cystidiis raris, hyalinis, spiniformibus, 20–50×8–10 μ, crasse tunicatis; sporis subglobosis, hyalinis, 5–6 μ diam.; contextu 2–3 mm crasso, lignicolori, radiante, nonnullis lacunis radiantibus oleiferis praedito; superficie apicum ope hypharum normaliter erectarum constituta.

Sommet du Mont Maquiling, Prov. Laguna, *Baker 3402.* Sur les rameaux tombés.

Plante très voisine de *Leptoporus canaliculatus* et de *L. pusiolus* et de constitution analogue. Les *L. concrescens, L. Braunii,* ont les mêmes cystides, mais la texture de la trame et la pellicules sont différentes.

SPONGIPELLIS Patouillard

SPONGIPELLIS STRAMINEUS Pat. in Bull. Soc. Myc. Fr. 24: 166, cum ic.; *Polyporus mollissimus* Pat. ap. Morot Journ. Bot. (1897) 340 (forme résupinée).

Mont Maquiling, Prov. Laguna, *Baker 2134*. Sur les vieux troncs pourris.

Dans tous les spécimens que nous avous vus, tant du Tonkin, que de la Nouvelle Caledonie ou des Philippines, nous n'avons pas rencontré de basides. La face interne des tubes est tapissée d'une couche d'arbuscules conidiferes, semblables à ceux de *Daedalea biennis*. Les spores signalées sont des conidies.

PHAEOLUS Patouillard

PHAEOLUS RIGIDUS (Lév.) ap. Zoll. Java No. 732 (*Polyporus*); *Polyporus durus* Jungh.; *Polyporus testudo* Berk.

Mont Maquiling, Prov. Laguna; près de Paete, Prov. Laguna, *Baker 2721, 3096*. Sur le bois pourri.

PHAEOLUS CARBONACEUS (Berk.) Journ. Linn. Soc. 10: 317 (*Polyporus*).

Los Baños, Prov. Laguna, *Reyes*, comm. *Baker 1275*. Sur les arbres morts.

LENZITES Fries

LENZITES TENUIS (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244.

Los Baños, Prov. Laguna, *Baker 2108, 2118, 2741, 3112*. Sur divers troncs d'arbres, *Bambusa, Leucaena glauca*, etc.

LENZITES PALISOTI Fr.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2244; forme *polyporée*.

Mont Banahao, Los Baños, Prov. Laguna, *Baker 2949, 2523*. Sur troncs morts.

LENZITES BERKELEYI Lév. var. **PHILIPPINENSIS** var. nov.

Mont Maquiling, Prov. Laguna, *Baker 2732*. Sur arbres morts.

Diffère de la forme typique, par son chapeau incisé-denté, par ses lames fréquemment anastomosées en pores et par son insertion disciforme.

LENZITES ACUTA Berk. in Lond. Journ. Bot. (1842) 146.

Mont Maquiling, Prov. Laguna, *Baker 3195*. Sur tronc mort.

HEXAGONA Fries

HEXAGONA BIVALVIS (Pers.) Bres.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2245.

Los Baños, *Baker 2114, 2396*. Sur les souches de *Macaranga*, etc.

HEXAGONA THWAITESII Berk.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2245.

Mont Maquiling, Los Baños, Prov. Laguna, *Baker 2536, 2741*. Sur le bois mort.

HEXAGONA THWAITESII Berk. var. **RETROPICTA** Bres.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2245.

Los Baños, Prov. Laguna, *Baker 2532*. Sur le bois pourri.

HEXAGONA LACHNOCHAETA sp. nov.

Pileo sessili, suborbiculari, postice adfixo, convexo-plano, 6–8 cm lato, molli, flexili, fibris mollibus, ramosis, acutis, fuscis, villosis tecto; margine recto, acuto, integro; contextu tenui, molli, rufo; hymenio plano, concolori, zona marginali sterili, velutina cincto; alveolis trametoideis, rotundato-angulosis, circiter 1 mm diam., dissepimentis integris, obtusis, concoloribus.

Mont Limay Prov. de Bataan, *Baker 3547*. Sur troncs pourris.

Espèce du groupe des "*setosae*" caracterisée par sa trame molle, non rigide et par soies souples et veloutées.

ELMERINA Bresadola

ELMERINA CLADOPHORA (Berk.) Bres.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2246.

Mont Maquiling, Prov. Laguna, *Baker 2128*. Sur les branches mortes.

ELMERINA FOLIACEA sp. nov.

Pileo sessili, tenui, carnoso-coriaceo dein indurato, convexo, exsicatione contracto incurvoque, albido in vivo, fusco-brunneo nigricante in sicco, rigido, fragili, radiatim sulcato, fibroso-rugoso, semi-orbiculari, 5 cm lato, postice attenuato, undique hispido-setuloso, setulis erectis, brevibus, rigidis, fulvescentibus, ex hyphis paralleliter conglutinatis compositis; margine acuto, incurvo, dentato-lacerato; contexto compacto, radiato, vix 1 mm crasso; lamellis radiantibus, antice rotundatis, latissimis (8 mm), postice attenuatis, fragilibus, distantibus, tenuibus, brevioribus immixtis, inter se liberis, rectis vel plicato-convolutis, acie lacera, zonis concentricis, fuscis, densiuscule pictis; cystidiis nullis; basidiis 18–20×6–8 μ; setulis fibroso-filamentosis rigidis (125-180×15–20 μ), totam paginam inferiorem pilei, superficiemque lamellarum obtegentibus.

Mont Maquiling, Prov. Laguna, *Baker 2742*. Sur troncs pourri.

Plante très curieuse, certainement congénère de la precédénte, mais s'éloignant bien plus du type *Hexagona* et prenant le facies agaricoide. Son chapeau est très mince, charnu sur le vivant, devenant dur, rigide et fragile en séchant. La partie inférieure porte des lames rayonnantes, non anastomosées, très larges et arrondies en avant, atténuées peu à peu en arrière et venant se terminer insensiblement au point d'insertion du champignon; leurs faces latérales sont marquées de zones concentriques rousses, plus ou moins serrées; ces lames sont droites en général, mais parfois on en observe de plissées-chiffonnées, ou contourneés.

Toute la plante es couverte abondamment de soies parenchymateuses dressées, tant sur la face superieure du chapeau que sur le plat des

lames, ou sur les interstices. Ces soies sont identiques à celles d'*Elmerina cladophora.*

Le genre *Elmerina*, limité aux especes minces, *charnues* on *charnues-souples* est parfaitement autonome. C'est l'homologue de *Lenzites* par la configuration hymenienne, mais en est bien distinct, ainsique d'*Hexagana*, par ses autres caracteres.

DAEDALEA Fries

DAEDALEA PHILIPPINENSIS sp. nov.

Pileo spongioso-molli, orbiculari, plano-depresso, circiter 10 cm diam., tomento leproso tecto, cremeo dein fuscescenti, azono; stipite elongato, 8 cm longo, 15 mm crasso, glabro, quasi vernicoso, concolori; poris angulosis, acutis, lacero-dentatis, decurrentibus; sporis ovoideo- subglobosis, stramineis, *echinulatis*, 7–9 $\times$5–6 μ; contextu ex hyphis tenacibus crasse tunicatis, 4–5 μ diam.

Sommet du Mont Maquiling, Prov. Laguna, *Baker 3394*. Sur bois pourri.

Cette espèce ressemble à certaines formes de *D. biennis* et comme elle, prend un aspect carné-roussatre par la dessication. Très semblable aussi à *D. novoguineensis* et se tachant également de noir. Elle est bien caractérisée par ses spores échinulées.

TRAMETES Fries

TRAMETES CORRUGATA (Pers.) Bres.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2247.

Mont Maquiling, Los Baños, Prov. Laguna, Baker *2106*, *2259*, *2526*, *2533*, *2493*, *2740*. Sur le bois mort.

TRAMETES SCOPULOSA (Berk.) Bres.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2247.

Los Baños, Prov. Laguna, *Baker 2535*. Forme à stipe grêle, sur une souche.

TRAMETES CORNEA Pat. ap. Morot. Journ. Bot. 4: 16.

Mont Maquiling, Los Baños, Prov. Laguna, *Baker 467*, *2109*. Sur divers arbres morts: *Leucaena glauca*, etc.

TRAMETES FUSCELLA (Lév.) ap. Zoll. Java, No. 3288 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 2914*. Sur les souches.

TRAMETES GRISEA Pat. ap. Morot. Journ. Bot. 11: 341.

Mont Maquiling, Prov. Laguna, *Baker 3104*. Sur les troncs morts.

TRAMETES FLAVA (Jungh.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2247.

Los Baños, Prov. Laguna, *Baker 2113*, *2522*. Sur le bois de *Leucaena glauca.*

TRAMETES CINGULATA Berk. Dec. Fungi No. 441.

Mont Maquiling, Prov. Laguna, *Baker 2129*. Sur le vieux bois.

TRAMETES VERSATILIS Berk. in Hook. Journ. Bot. 1: 150.

Los Baños, Prov. Laguna, *Baker 2519*. Sur troncs pourris.

CORIOLUS Quelet

CORIOLUS VINOSUS (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2248.

Los Baños, Prov. Laguna, *Baker 2010*. Sur bois pourri.

CORIOLUS HIRSUTUS (R.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2248.

Los Baños; Mont Banahao, Prov. Laguna, *Baker 2528, 2946, 2947*. Sur branches mortes.

CYCLOMYCES Fries

CYCLOMYCES CICHORIACEUS (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2249; *Hexagona tabacina* Lév.

Sommet du Mont Maquiling, Prov. Laguna, *Baker 3898*. Sur les branches tombées.

CYCLOMYCES SPADICEUS Jungh. Java 54, *tab. 13, fig. 30* (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 2491, 2602, 3202*. Sur bois pourri.

CYCLOMYCES TABACINUS Mtg. Chil. 7: 361, *tab. 7, fig. 6* (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 2117, 3397*. Sur les branches mortes.

PHELLINUS Quelet

PHELLINUS WILLIAMSII (Murr.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 7 (1914) 2249.

Mont Maquiling; Mount Banahao, Prov. Laguna, *Baker 2131, 2255, 3196, 3403, 3407*. Sur les troncs morts.

PHELLINUS GILVUS (Schw.) Carol. No. 897 (*Boletus*).

Los Baños, Prov. Laguna, *Teodoro*, comm. *Baker 1221; Baker 2530;* Mont Maquiling, *Baker 2734*. Sur le bois mort.

PHELLINUS KERMES (Berk.) Journ. Linn. Soc. 14: 49.

Mont Maquiling, Prov. Laguna, *Baker 2115*. Sur troncs pourris.

XANTHOCHROUS Patouillard

XANTHOCHROUS DISCIPES (Berk.) Dec. Fung. No. 170 (*Polyporus*).

Mont Banahao; Mont Maquiling, Prov. Laguna, *Baker 2120, 2125, 2237, 3194*. Sur le bois mort.

Varie sessile ou stipité, solitaire ou imbriqué, mince ou épais, simplement zoné ou fortement sillonné, ridé, rugueux, glabrescent ou villeux. Les tubes peuvent être très courts ou atteindre deux à trois millimètres.

GANODERMA Karsten

GANODERMA AUSTRALE (Fr.) Pat.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2250.

Mont Maquiling, Los Baños, Prov. Laguna, *Baker 2613, 2735, 2119, 3353, 3388, 3393*. Sur les souches.

GANODERMA LEUCOPHAEUM (Mtg.) Pat.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2250.

Baguio, Subprov. de Benguet, sur *Pinus insularis*, *Copeland*, comm. *Baker 1303;* Mont Banahao, Prov. Laguna, *Baker 2945*, sur tronc pourri.

GANODERMA MASTOPORUM (Lév.) Pat.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2249.

Forme stipitée, pleuropode: près de Paete, Prov. Laguna, *Baker 3099*. Sur vieille souche. Forme sessile: Los Baños, Prov. Laguna, *Baker 3111*.

GANODERMA MULTIPLICATUM (Mgt.) Pat. Bull. Soc. Myc. Fr. (1889) 74.

Mont Maquiling, Prov. Laguna, *Baker 889*. Sur tronc mort d'*Areca*.

GANODERMA AMBOINENSE (Lam.) Pat.; Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2250.

Mont Maquiling, Prov. Laguna, *Baker 3198, 3900*. Sur troncs à terre.

GANODERMA AMBOINENSE (Lam.), forma **LINGUA** (*Polyporus lingua* Nees in Act. Cur. Nat. 13, *tab. 3*).

Sommet du Mont Maquiling, Prov. Laguna, *Baker 3406*. Sur troncs morts.

Série remarquable de spécimens à pied grele, présentant tous les intermediaires entre la forme typique et celle figurée par Nees *loc. cit.*

GANODERMA MANGIFERAE (Lév.) Pat. in Bull. Soc. Myc. Fr. (1889) 74.

Mont Maquiling; Los Baños; pres de Paete, Prov. Laguna, *Baker 2135, 2715, 3097, 3109, 3197*. Sur les vieux troncs.

GANODERMA BAKERI sp. nov.

Pileo suberoso-lignoso, suborbiculari, stipite dorsali adfixo, glabro, ruguloso, plus minus radiatim venoso, zonato-sulcatulo, obscure umbrino, margine recto, sinuoso, albido-fuscescenti, 4 cm diametro, crusta tenui opaca tecto; contextu lignicolori, 2–4 mm crasso, ex hyphis hyalinis, 3–5 μ latis; stipite dorsali, brevissimo vel obsoleto, subcylindraceo, rugoso-toruloso, subcristato; tubulis alutaceis, 2–8 mm longis, poris grandiusculis (3 pro mm) saepe subquadratis, dissepimentis tenuibus, integris; pagina inferiori pilei applanata, albida; sporis late obovatis, une fine truncatis, fuscis, tuberculoso-rugosis, 8–9$\times$6 μ.

Los Baños, Prov. Laguna, *Baker 2104, 2105*. Sur troncs pourris. Parait affine a *G. Höhnelianum* Bres. et à *G. umbrinum* Bres.

GANODERMA PLICATUM sp. nov.

Pileo suberoso-lignoso, subreniformi, postice dorsaliter stipite parvo adfixo, castaneo-fusco, opaco, subpruinoso, radiatim plicato-venoso, concentrice zonato, zonis crebris concoloribus, crustula opaca tecto, margine crenulato, recto, subacuto, albo, 5 cm diam.; contextu sericeo-molli, pallide fusco, 2 mm crasso, ex

hyphis fuscidulis, 3–5 μ latis; stipite brevissimo (1 cm longo et crasso), rugoso, concolori; tubulis 5 mm longis, castaneis; pagina inferiori pilei planiuscula, albida dein fuscidula; poris punctiformibus (4 pro mm), dissepimentis integris, tenuibus; sporis obovatis, levibus vel vix punctatis, 8×6 μ.

Mont Maquiling, Prov. Laguna, *Baker 2736*. Sur tronc pourri.
Voisin du précédent.

GANODERMA (AMAURODERMA) RUGOSUM Nees Fung. Jav. *tab. 7* (*Polyporus*).

Sommet de Mont Maquiling, Prov. Laguna, *Baker 3408*. Sur débris vegetaux enterrés.

UNGULINA Patouillard

UNGULINA AUBERIANA (Mtg.) Syll. Crypt. n. 500 (*Polyporus*).

Mont Maquiling, Prov. Laguna, *Baker 9603*. Sur troncs pourris.

UNGULINA CONTRACTA (Berk.); Cfr. Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2251.

Mont Maquiling, Prov. Laguna, *Baker 3392*. Sur branches mortes.

ACIA Karsten

ACIA FRAGILISSIMA (Berk. et Curt.) (*Hydnum*); *Hydnum chrysocomum* Underw.

Mont Maquiling, Prov. Laguna, *Baker 1168*. Sur vieux bois.

PANUS Fries

PANUS ANTHOCEPHALUS (Lév.) Fr. Nov. Symb. 40; *Agaricus* Lév. in Ann. Sc. Nat. 3 (1846) 115.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 3225, 3350*. Sur *Aleurites moluccana*.

LENTINUS Fries

LENTINUS SQUARROSULUS Mtg. Syll. Crypt. No. 450.

Los Baños, Mont Maquiling, Prov. Laguna, *Baker 2529, 2733*. Sur troncs pourris.

LENTINUS MELANOPUS Pat. in Bull. Soc. Myc. Fr. 8: 47.

Los Baños, Prov. Laguna, *Baker 1144*. Sur bois pourri.

CRINIPELLIS Patouillard

CRINIPELLIS GALEATUS (Berk. et Curt.) Pat. ap. Morot in Journ. Bot. (1889) 336; *Marasmius galeatus* Berk. et Curt. U. S. North Pacif. Explor. Exped. no. 69.

Mont Maquiling, Prov. Laguna, *Mirasol*, comm. *Baker 1178*. Sur brindilles à terre.

CRINIPELLIS FRAGILIS sp. nov.

Gregarius, sessilis, cupuliformis, fragilis, 2–4 mm latus; pileo pallide isabellino, sulcatulo, glabriusculo, margine acuto; cute

tenui, ex hyphis hyalinis tenacibus, 3–4 μ crassis; lamellis e puncto centrali radiantibus, ventricosis, parum confertis, integris, saturatioribus; cystidiis nullis; sporis.....

Los Baños, Prov. Laguna, *Baker 2568;* sur petits rameaux pourris.

Proche du précédent, mais fragile et n'ayant pas la consistance de cuir caractéristique.

PLEUROTUS Fries

PLEUROTUS APPLICATUS Fr. var. **CYSTIDIATUS** var. nov.

Los Baños, Prov. Laguna, *Baker 1015.* Sur petites branches mortes.

Diffère e la forme habituelle, par la présence de cystides, 15×10 μ; spores globuleuses, 6 μ.

COPRINUS Fries

COPRINUS FRIESII Quelet Jura et Vosg. 159, *t. 23, fig. 5.*

Los Baños, Prov. Laguna, *Raimundo,* comm. *Baker 1652.* Sur les spathes pourries du cocotier.

LYCOPERDON Tournefort

LYCOPERDON CEPIFORME Bull. *pl. 435, fig. 2.*

Los Baños, Prov. Laguna, *Reyes,* comm. *Baker 1145.* Sur le sol.

LYCOPERDON PRATENSE Schum. Enum. 2: 193.

Los Baños, Prov. Laguna, *Baker 1235.* Sur le sol.

LYCOPERDON PLICATUM Berk. et Curt. U. S. North Pac. Explor. Exped. (1853–56).

Los Baños, Prov. Laguna, *Raimundo,* comm. *Baker 1431; Reyes,* comm. *Baker 1146.* Sur la terre.

CYATHUS Hall

CYATHUS MONTAGNEI Tul.; Pat. in Elm. Leafl. Philip. Bot. 6 (1914) 2255.

Los Baños, Prov. Laguna, *Reyes,* comm. *Baker 3648.* Sur les brindilles à terre.

SCLERODERMA Persoon

SCLERODERMA DICTYOSPORUM Pat. in Bull. Soc. Myc. Fr. 12: 135 (*S. zenkeri* Henn.).

Mont Maquiling, Prov. Laguna, *Baker 3287.* Sur la terre d'un talus.

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STUDIES ON PHILIPPINE RUBIACEAE, II

By E. D. MERRILL [1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The first paper of this series was published in the year 1913 [2] in which 35 new species were described with the addition of critical notes on previously described forms. The present paper is essentially similar to the first, consisting of critical notes especially in the genera *Mycetia* (*Adenosacme*), *Chasalia, Psychotria,* and *Grumilea,* with the descriptions of 42 new species in various genera. The genus *Praravinia* is new to the Philippines. The genus *Coelospermum* has been excluded from the Philippine flora by the reference of *C. ahernianum* Elm. to its proper genus, *Psychotria.* In connection with the recognition of *Grumilea* as a valid genus, it has been considered expedient briefly to enumerate all the Philippine species previously placed in the genus *Psychotria,* most of which are now transferred to *Grumilea.* The genus *Psychotria,* in the sense of Bentham and Hooker f., is a very large one in the Philippines, probably at least 90 distinct species being represented in the material already collected. In *Psychotria,* with the segregates *Grumilea* and *Streblosa,* 74 species are enumerated in the present paper, but a number of forms still remain to be described. As new forms are constantly being received as botanical exploration progresses many future additions are to be expected in this group.

OPHIORRHIZA Linnaeus

OPHIORRHIZA LINEARIFOLIA sp. nov.

Planta erecta, ramosa, 10 ad 20 cm alta, plus minusve ferrugineo-furfuracea; foliis numerosis, linearis, usque ad 4 cm longis, 2.5 ad 6 mm latis, obscure undulatis, stipulis lineari-lanceolatis, 3 mm longis; floribus terminalibus, solitariis, pedunculatis, circiter 4 mm longis.

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[2] This Journal 8 (1913) Bot. 31–62.

A small, erect, slender, much branched plant 10 to 20 cm high, most parts more or less ferruginous-furfuraceous. Leaves numerous, linear, 1.5 to 4 cm long, 2.5 to 6 mm wide, obscurely undulate, equally narrowed to the acute base and the somewhat acuminate apex, the upper surface dark-olivaceous when dry, the lower pale, ferruginous-furfuraceous; nerves about 6 on each side of the midrib, reticulations obsolete; petioles 2 to 5 mm long; stipules pubescent, linear-lanceolate, acuminate, 3 mm long. Flowers terminal, solitary, their pedicels about 2 mm long, the bracteoles linear, 2 mm long. Calyx-tube somewhat globose, the teeth linear, 1 mm long. Corolla-tube cylindric, 3 mm long, the lobes oblong, obtuse, about 2 mm in length. Fruit compressed, about 3 mm long and 5 mm wide, somewhat ferruginous-furfuraceous.

BASILAN, *Bur. Sci. 16109 Reillo,* August 29, 1912, in forests at Comalarang.

A very striking species, characterized by its very narrow leaves, solitary flowers, and ferruginous-furfuraceous indumentum.

ARGOSTEMMA Wallich

ARGOSTEMMA STENOPHYLLUM sp. nov.

Planta parva, erecta, simplex, 8 ad 12 cm alta; foliis lanceolatis ad oblanceolatis, chartaceis, in siccitate subnigris, usque ad 6 cm longis, obtusis vel acutis, leviter furfuraceis; floribus solitariis vel binis, 5-meris, circiter 8 mm longis, sepalis obtusis, petalis longe acuminatis.

A small, erect, unbranched plant 8 to 12 cm high, the stems, lower surface of the leaves along the midrib, and pedicels somewhat furfuraceous-pubescent. Leaves lanceolate or oblanceolate, chartaceous, dark-colored when dry, 2.6 to 6 cm long, 2.5 to 7 mm wide, narrowed at both ends, the apex obtuse or acute, base acute or decurrent-acuminate, the lower surface a little paler than the upper, lateral nerves up to 10 on each side of the midrib, not prominent; stipules oblong-ovate, about 3 mm long; petioles 2 to 4 mm long. Flowers 5-merous, terminal and in the upper axils, white, solitary or in pairs, the pedicels 5 to 15 mm long, often elongated in fruit. Calyx outside rather densely pilose, including the teeth 4 mm long, the teeth oblong, obtuse, about 2 mm long. Corolla-lobes lanceolate, long-acuminate, 6 mm long, slightly pilose. Anthers yellow, 6 mm long.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 20566 Ramos,* March 10, 1913, on rocks along the river.

A species allied to *Argostemma wallichii* Walp. and *A. solaniflorum* Elm., distinguished, however, by its very narrow leaves.

WENDLANDIA Bartling

WENDLANDIA WILLIAMSII sp. nov.

Arbor parva, inflorescentiis densissime villoso-tomentosis; foliis amplis, chartaceis, circiter 27 cm longis, breviter abrupte acuminatis, basi decurrento-acuminatis, subtus plus minusve pubescentibus, nervis utrinque circiter 15; paniculis folia subaequilongis, pyramidatis, multifloris; floribus numerosis, 8 mm longis.

A small tree, the branches brownish, glabrous, the branchlets somewhat pubescent. Leaves subelliptic, chartaceous, brownish when dry, about 27 cm long, 15 cm wide, the apex shortly and rather abruptly acuminate, base decurrent-acuminate, the upper surface somewhat pubescent along the midrib, otherwise with scattered hairs, the lower surface rather uniformly pubescent with somewhat scattered hairs; petioles stout, 2 to 3 cm long; lateral nerves about 15 on each side of the midrib, rather prominent; stipules reniform, at least 1 cm wide. Panicles terminal, pyramidal, about as long as the leaves, very many flowered, the lower branches 20 cm long, all parts densely villous-tomentose with pale or pale-brown hairs, the younger branchlets very densely so. Flowers white, numerous, somewhat crowded on the branchlets, 8 mm long, the calyx densely tomentose, the teeth acute.

MINDANAO, District of Zamboanga, Sax River, *Williams 2084*, Feb. 1, 1905, altitude about 130 meters. Probably referable to the same species are *Williams 2341* and *Ahern 564*, from the same district.

Probably most closely allied to the Javan *Wendlandia rufescens* Miq., but the flowers on our material are much longer than those on Javan specimens which are apparently authentically named.

NAUCLEA Linnaeus

NAUCLEA BERNARDOI sp. nov.

Arbor glabra 12 ad 20 m alta; foliis coriaceis, usque ad 12 cm longis, ellipticis ad oblongo-obovatis, in siccitate brunneis, nitidis, nervis utrinque circiter 10, subtus prominentibus; inflorescentiis terminalibus, paniculatis, 6 ad 10 cm longis, capitulis 9 vel 11, pedunculatis, sub anthesis circiter 1.5 cm diametro.

A glabrous tree 12 to 20 m high, the branches terete, light-gray. Leaves thickly coriaceous, when dry brown, brittle, elliptic to oblong-obovate, 9 to 12 cm long, 4 to 6 cm wide, somewhat acuminate, base acute, when dry usually dark-brown, somewhat shining, the lower surface paler then the upper; lateral nerves 10 on each side of the midrib, prominent, anastomosing, the reticulations subparallel, lax, slender; petioles 1 to 1.5 cm long;

stipules caducous. Inflorescence terminal, paniculate, 6 to 10 cm long, 9 or 11 heads in each panicle, their peduncles 1.5 to 2.5 cm long, the heads, in anthesis, about 1.5 cm in diameter, in fruit 1 to 1.2 cm in diameter. Calyx somewhat pubescent, 3 mm long, the tube 2 mm long, the lobes 5, obtuse, somewhat spatulate. Corolla glabrous, 4 mm long, slightly enlarged upward, the lobes oblong, obtuse, 1 mm long. Anthers 1 mm long. Style 4 mm long; stigma globose-ovoid. Capsules 4 to 5 mm long, oblong-fusiform, glabrous.

LUZON, Province of Cagayan, *For. Bur. 12991, 20446* (type) *Bernardo*, February, 1912, May, 1913, *For. Bur. 7048 Klemme*, May, 1907, locally known as *ludoc*, *cudsud*, and *maragatan*. Here I also refer *For. Bur. 20197 Villamil*, from Mount Maquiling, Province of Laguna, Luzon, *Ahern 102* from Camarines Province, Luzon, and *Merrill 2613* from Masbate.

The species is strongly characterized by its panicled inflorescence, and in this suggests *Adina*. The vegetative characters and all the characters of the flowers and fruits are those of *Nauclea* to which genus the species properly belongs.

UNCARIA Schreber

UNCARIA PACHYPHYLLA sp. nov.

Frutex scandens inflorencentiis exceptis glaber; foliis late ovatis, crasse coriaceis, in siccitate brunneis vel pallide brunneis, usque ad 15 cm longis, breviter late obtuseque acuminatis, basi rotundatis ad leviter decurrento-acuminatis, nervis utrinque 5, prominentibus; capsulis pedicellatis, ebracteolatis, 1 ad 1.5 cm longis, pubescentibus, subfusiformibus, calycis lobis persistentibus, obtusis, circiter 0.5 mm longis.

A scandent shrub quite glabrous except the inflorescence. Branches dark-brown to nearly black when dry, shining. Leaves thickly coriaceous, glabrous, somewhat shining, brown or pale-brown when dry, the lower surface a little paler then the upper and sometimes glaucescent, broadly ovate, 10 to 15 cm long, 5.5 to 9 cm wide, the apex broadly, shortly, and obtusely acuminate, the base rounded to somewhat decurrent-acuminate; lateral nerves 5 on each side of the midrib, prominent, curved-ascending, the reticulations fine, rather dense, subparallel, the upper surface obscurely subfoveolate; petioles 1.5 to 2 cm long; stipules not seen; hooks stout, recurved, shining, glabrous. Heads solitary, when very young densely gray-pubescent, in fruit 3 to 3.5 cm in diameter, the capsules pedicelled, ebracteolate, 1 to 1.5 cm long, fusiform, about 2 mm in diameter, appressed-pubescent, the pedicels 5 mm long or less, pubescent, the persistent calyx-lobes about 0.5 mm in diameter, obtuse, pubescent.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 16652 Ramos* (type),

September, 1912. To this species I also refer the following specimens: Province of Rizal, *For. Bur. 407 Ahern's collector*, February, 1904, *Bur. Sci. 13786 Ramos*, October, 1914: Province of Nueva Vizcaya, *Bur. Sci. 11378 McGregor*, April, 1912. NEGROS, *For. Bur. 19071, 19100 Curran*, October, 1909.

The species is allied to *Uncaria canescens* Korth., but has quite glabrous leaves and fewer nerves. It also seems to approach *Uncaria pteropoda* Miq., but the nerves are fewer and the petioles are not winged.

MUSSAENDA Linnaeus

MUSSAENDA PALAWANENSIS sp. nov.

Frutex erectus 2 ad 3 m altus, plus minusve ciliato-hirsutus; foliis oblongis ad oblongo-ovatis, breviter petiolatis, usque ad 13 cm longis, acuminatis, chartaceis, nervis utrinque circiter 10; inflorescentiis terminalibus, cymosis; calycis lobis 5, lanceolatis, acuminatis, circiter 7 mm longis, deciduis; corolla aurantiaca, circiter 2.2 cm longa, lobis brevibus, apiculato-acuminatis.

A shrub 2 to 3 m high, erect, most parts more or less ciliate-hirsute, the younger parts densely do. Branches reddish-brown, terete, glabrous, the younger ones hirsute. Leaves of each pair subequal, oblong to oblong-ovate, 7 to 13 cm long, 3 to 6 cm wide, subequally narrowed to the acute or rounded base and the acuminate apex, chartaceous, pale or brownish when dry, slightly shining, the upper surface with scattered, rather stiff hairs, the lower surface rather prominently ciliate with scattered, pale hairs; lateral nerves about 10 on each side of the midrib; petioles 5 mm long or less, hirsute; stipules about 6 mm long, lanceolate, acuminate, hirsute. Cymes terminal, rather few flowered, densely ciliate-hirsute, the flowers crowded, 5-merous, yellow. Calyx-tube about 6 mm long, densely hirsute, the teeth lanceolate, long and slenderly acuminate, about 7 mm long, more or less pubescent, deciduous, the leaflike, enlarged one white, chartaceous, ovate, blunt-acuminate, slightly hirsute, the blade up to 8 cm long, the petiolar part 1 to 1.5 cm long. Corolla infundibuliform, white, 2.2 cm long, the tube densely appressed-hirsute outside, somewhat enlarged upward, the lobes broadly ovate, 6 to 7 mm long, their apices prominently acuminate. Fruit ovoid or somewhat obovoid, about 7 mm long, truncate, base acute, outside slightly hirsute with few scattered hairs.

PALAWAN, Alphonso XIII, *Bur. Sci. 15531 Fénix* (type), July, 1912; Point Separation, on the opposite side of the island, *Merrill 867*, Feb. 18, 1903, in old clearings, thickets, etc.

A species perhaps as closely allied to *Mussaenda philippica* Rich. as to any other species, well characterized, however, by its long acuminate sepals and its prominently and rather abruptly acuminate calyx lobes.

MUSSAENDA SETOSA sp. nov.

Frutex 3 ad 4 m altus, omnibus partibus plus minusve setosus vel ciliato-setosus; foliis chartaceis, oblongo-ellipticis, usque ad 25 cm longis, acuminatis, basi decurrento-acuminatis, nervis utrinque 15 ad 18, prominentibus; inflorescentiis terminalibus, cymosis, laxis, divaricato-ramosis, usque ad 20 cm longis, paucifloris, calycis lobis 5, lineari-lanceolatis, hirsutis, 5 ad 7 mm longis, subpersistentibus, corolla cylindracea, circiter 3 cm longa.

A shrub or small tree 3 to 4 m high. Branches terete, pale grayish-brown, the younger ones hirsute. Leaves in equal pairs, chartaceous, oblong-elliptic or elliptic, 15 to 25 cm long, 9 to 13 cm wide, subequally narrowed to the somewhat acuminate apex and to the prominently decurrent-acuminate base, equilateral, olivaceous and somewhat shining when dry, somewhat rough, both surfaces with stiff, scattered, brown or pale, setose-ciliate hairs; lateral nerves 15 to 18 on each side of the midrib, prominent, anastomosing, the reticulations lax, prominent; petioles 2 to 3 cm long; stipules ovate, acuminate, hirsute, 6 mm long. Cymes terminal, divaricate, rather few flowered, up to 20 cm long, hirsute-ciliate with brownish spreading hairs. Flowers 5-merous, few crowded at the ends of the branches, subsessile or shortly pedicelled. Calyx hirsute, the tube at anthesis about 6 mm long, the lobes linear-lanceolate, hirsute, 5 to 7 mm long, subpersistent. Corolla slender, the tube cylindric, white, hirsute, about 3 cm long, the lobes spreading, yellow, broadly ovate, acute or obscurely acuminate. Calyx-lobes persisting until the fruit is nearly or quite ripe. Enlarged calyx-lobe white, broadly ovate, slightly acuminate, membranaceous, somewhat pubescent, the blade up to 7 cm long, the petiolar part less than 1 cm long. Fruit ellipsoid, sparingly hirsute, 1.5 cm long, black when dry.

PALAWAN, Mount Capoas, Malampaya Bay, *Merrill 9496*, April 21, 1913, on forested ridges, altitude about 700 meters.

A species well characterized by its long slender corolla, its rather large, prominently veined leaves, its divaricately branched, rather large cymes, and its setose-ciliate or hirsute indumentum of scattered, more or less spreading, pale or brownish hairs.

MYCETIA Reinwardt

Reinwardt's generic name is the earliest valid one for those species that are by most botanists referred to *Adenosacme* Wall. Blume, in 1826, placed several species under the genus *Bertiera* Aubl., but Aublet's genus is quite different from *Mycetia;* Blume cites *Mycetia* Reinw. as a synonym of *Bertiera*. *Mycetia* was published by Reinwardt in 1828, while *Adenosacme* of Wallich was proposed in 1832. The case is not covered by the generic

lists of *nomina conservanda* adopted by the Vienna and the Brussels botanical congresses.

MYCETIA LATERIFLORA (Blume) Korth. in Nederl. Kruidk. Arch. 2 (1850) 118.

Bertiera lateriflora Blume Bijdr. (1826) 988.
Mycetia cauliflora Reinw. Syll. Ratisb. 2 (1828) 8; Valeton in Ic. Bogor. 3 (1909) 219, *t. 281.*
Adenosacme apoensis Elm. Leafl. Philip. Bot. 3 (1911) 1001.

I can see no valid reason for distinguishing the Philippine form from the Javan one. Comparing the full descriptions of Mr. Elmer and Dr. Valeton differences are evident, but these differences disappear when actual specimens are compared. The Philippine plant has more slender and somewhat longer calyx teeth than the Javan species as described and figured by Valeton, yet some of our Javan specimens present calyx teeth nearly as long as the Philippine material. The species, whether considered as identical with the Javan one, or whether considered as distinct, is represented by the following Philippine specimens:

MINDORO, Mount Teluto, *For. Bur. 11470, 12076 Merritt.* MINDANAO, Bukidnon Subprovince, *Bur. Sci. 15748 Fénix:* District of Lanao, Camp Keithley, *Mrs. Clemens 860, s. n.:* District of Davao, Mount Apo, *Copeland s. n., Elmer 10504* (type number of *Adenosacme apoensis* Elm.).

The species is certainly very close to Indian material distributed as *Adenosacme longifolia* Wall. (*Hooker & Thompson,* Sikkim and Khasia) and as Valeton suggests it may prove to be identical with *Rondeletia longifolia* Wall. ex. Roxb. Fl. Ind. ed. Carey & Wall. 2 (1824) 137, which is not *Adenosacme longifolia* Wall., at least as described by King & Gamble in Journ. As. Soc. Beng. 72² (1903) 196. *Adenosacme scortechinii* King & Gamble l. c. 197 should be critically compared with *Mycetia lateriflora* Korth.

MYCETIA JAVANICA (Blume) Korth. in Nederl. Kruidk. Arch. 2 (1850) ex Valeton in Ic. Bogor. 3 (1908) 183, *t. 270.*

Bertiera javanica Blume Bijdr. (1826) 987.
Adenosacme longifolia Auct. (non Wall.?), non *Rondeletia longifolia* Wall. ex Roxb. Fl. Ind. ed. Carey & Wall. 2 (1824) 137.
Adenosacme mindanaensis Elm. Leafl. Philip. Bot. 3 (1911) 1002.

The Philippine plant is certainly specifically identical with material from Singapore (Bukit Timah, *Ridley*) and Pinang (*Deschamps*), distributed as *Adenosacme longifolia* Wall. The plant is rather variable in its indumentum, but in essential characters appears to be decidedly constant. In most of the Philippine forms the inflorescence is decidedly more lax than in the Javan form as figured by Valeton, and quite similar to that of the Singapore and Penang form. Several forms can be distinguished, but I am not at all convinced that any of them are worthy of specific or even varietal rank:

Forma A. Inflorescence rather lax, or at least the infructescence lax; calyx, corolla, and fruits glabrous or nearly so. This form is very near var. *genuina* Valeton l. c. 185, and includes *Adenosacme mindanaensis* Elm.

LUZON, Province of Albay, *Cuming 942* (young inflorescence). SAMAR, *Bur. Sci. 17490 Ramos.* LEYTE, *Wenzel 567.* MINDANAO, Subprovince of

Bukidnon, *Bur. Sci. 15761 Fénix:* District of Davao, *Elmer 10831:* Province of Agusan, *Elmer 13459.*

Forma B. Infructescence rather dense, not exceeding 3 cm in length; fruits glabrous.

MINDANAO, District of Zamboanga, *Merrill 8138, Williams 2100 bis.*

Forma C. Inflorescence lax; calyx and fruit glabrous or nearly so; leaves rather densely pubescent.

MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens 69, 230,* and several sheets without number.

Forma D. Calyx and fruit distinctly hirsute.

LUZON, Province of Laguna, Los Baños, *Baker 1481, 401, 967;* Mount Banajao, *Bur. Sci. 6092 Robinson.* MINDORO, *Merrill 5573, For. Bur. 9967 Merritt.* SAMAR, *Phil. Pl. 1697 Ramos.*

This shrub is a very characteristic one of deep, damp, shaded ravines growing along small streams. It extends to an altitude of about 1,200 meters, but in some regions, Laguna Province, occurs as low as 100 meters altitude or less.

It extends from Penang and the Malay Peninsula through the Malay Archipelago to New Guinea. I believe that Valeton is correct in considering *Adenosacme longifolia* Wall., as described by Hooker f., to be a mixture of two or three different species.

UROPHYLLUM Wallich

UROPHYLLUM ACUMINATISSIMUM sp. nov.

Frutex glaber; foliis lanceolatis vel oblongo-lanceolatis, usque ad 14 cm longis, membranaceis vel chartaceis, basi acutis, apice longe caudato-acuminatis apiculatisque, nervis utrinque circiter 9; floribus axillaribus terminalibusque, plerumque solitariis, longe pedicellatis; fructibus globosis, circiter 5 mm diametro.

A shrub, quite glabrous except the slightly pubescent very young branchlets. Branches slender, terete, reddish-brown, the young branchlets pale. Leaves lanceolate or oblong-lanceolate, 10 to 14 cm long, 2.5 to 3.5 cm wide, membranaceous or chartaceous, base acute, apex long and slenderly caudate-acuminate, the acumen ending in a distinct apiculus, the upper surface olivaceous, shining, the lower paler, shining; lateral nerves about 9 on each side of the midrib, prominent on the lower surface, curved-anastomosing, the reticulations lax, distinct; petioles 5 to 7 mm long; stipules linear-lanceolate, acuminate, as long as the petioles. Flowers axillary and solitary or sometimes in a few-flowered apical fascicle, the pedicels, in fruit, about 1 cm long. Fruit globose, yellowish when fresh, about 5 mm in diameter.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 20423 Ramos,* February, 1913, in forests.

A species with much the general appearance of *Urophyllum arboreum* Korth., and manifestly allied to that form, differing in its solitary or fascicled, not umbellate flowers, and its very slenderly acuminate leaves.

PRARAVINIA Korthals

PRARAVINIA EVERETTII sp. nov.

Frutex dioicus, partibus junioribus floribusque plus minusve hirsutus; foliis lanceolatis vel oblongo-lanceolatis, tenuiter acuminatis, usque ad 11 cm longis, nervis utrinque 7 vel 8; floribus axillaribus, solitariis, involucris calycibusque extus hirsutis, petalis 6 vel 7; fructibus junioribus hirsutis.

A dioecious shrub. Branches slender, terete, light-gray, glabrous, the branchlets more or less hirsute. Leaves lanceolate to oblong-lanceolate, pale and somewhat shining when dry, glabrous, or the midrib beneath somewhat hirsute, 7 to 11 cm long, 1.2 to 3 cm wide, narrowed upward to the long and slenderly acuminate apex, the base acute; lateral nerves 7 or 8 on each side of the midrib, prominent, curved-ascending, anastomosing; petioles 8 to 12 mm long, ultimately glabrous; stipules lanceolate, deciduous, about 1 cm long. Flowers axillary, solitary, yellowish, so far as our material shows the males on one plant, the females on separate ones. Male flowers sessile, subtended by 2 basal involucres, each more or less 4-lobed, hirsute, the first 1.5 mm in diameter, the second about 2.5 mm in diameter. Calyx similar to the involucres but much larger, hirsute, membranaceous, up to 3.5 mm long, 4-lobed. Corolla-tube about 3 mm long, glabrous externally, the lobes 6 or 7, lanceolate, about 5 mm long, 2 mm wide, acuminate, somewhat villous externally, the throat very densely villous with stiff white hairs 1.5 to 2 mm long. Anthers 1.5 mm long, apiculate. Ovary a mere rudiment. Female flowers in general similar to the males, the anthers more or less aborted and without pollen. Calyx somewhat tubular, hirsute, 4-lobed, the lobes triangular-ovate, somewhat acuminate, 1.5 mm long, the subtending involucre 4-lobed, 4 to 5 mm in diameter, membranaceous, villous. Fruit apparently fleshy, many-seeded.

NEGROS, Mount Silay, *For. Bur. 7294* (type), *7268 Everett*, May 9, 1907, on ridges in forests, altitude about 700 meters.

The fifth species for the genus, two being known from Borneo and two from Celebes.

WILLIAMSIA Merrill

WILLIAMSIA MULTINERVIA sp. nov.

Frutex 3 ad 4 m altus, subglaber; foliis oblongis, rectis, circiter 20 cm longis, acuminatis, nervis utrinque circiter 18; stipulis usque ad 4 cm longis, deciduis; fructibus anguste ovoideis, circiter 12 mm longis, 7-locellatis.

A shrub 3 to 4 m high, the branches terete, the branchlets pale-brownish, distinctly verruculose. Leaves opposite, oblong, chartaceous, pale when dry, somewhat shining, glabrous, 15 to

22 cm long, 4 to 6.5 cm wide, the apex abruptly and sharply acuminate, the base acute; lateral nerves about 18 on each side of the midrib, prominent; petioles 1.5 to 2 cm long; stipules narrowly oblong, about 4 cm long, 5 mm wide, sligthly pilose, obtuse, the nodes under the deciduous stipules distinctly bearded. Flowers axillary, fascicled, apparently shortly pedicelled (not seen). Fruit pale-yellow when fresh, narrowly ovoid, nearly glabrous, about 12 mm long, 7 mm in diameter, about 7-celled, the persistent basal involucre of 4 lobes united for about 3 mm, two lobes ovate, acute, 8 mm long, 7 mm wide, alternating with two oblong acute lobes about 4 mm long and 3 mm wide, the involucre itself glabrous or nearly so externally, inside very densely villous, seated on a thickened villous disk and subtended by a lanceolate, acuminate, villous bracteole about 3.5 mm long; persistent calyx-teeth 4, broadly ovate, rounded, 2 mm long, externally sparingly villous, internally densely so.

MINDANAO, District of Zamboanga, Sax River mountains back of San Ramon, *Merrill 8085* (type), November 28, 1911, in damp forests, altitude 600 to 900 meters. BASILAN, *For. Bur. 18933 Miranda*, September, 1912, *Bur. Sci. 16110 Reillo*, August, 1912.

Quite distinct from *Williamsia sablanensis* (Elm.) Merr., the type of the genus, in its straight, not at all falcate, more numerously nerved leaves, and its much longer stipules.

WILLIAMSIA GLABRA sp. nov.

Frutex 2 m altus, glaber vel subglaber; foliis lanceolatis, tenuiter acuminatis, rectis, chartaceis vel subcoriaceis, usque ad 14 cm longis, in siccitate pallidis, nitidis, nervis utrinque circiter 7; floribus parvis, 4-meris, involucris 3, superpositis.

A shrub about 2 m high, nearly glabrous. Branches terete, glabrous, pale greenish-yellow, slender. Leaves opposite, lanceolate, chartaceous to subcoriaceous, 11 to 14 cm long, 2.5 to 4 cm wide, entire, the apex long and slenderly acuminate, the base acute, glabrous, when dry pale and shining; lateral nerves about 7 on each side of the midrib, prominent, curved-ascending, anastomosing; petioles 1 to 1.5 cm long; stipules linear to linear-lanceolate, 10 to 12 mm long. Flowers nearly white, axillary, solitary or somewhat fascicled, subsessile or on a very short stout pedicel, each flower subtended by 3, cup-shaped, superposed involucres, the lowermost one 1.5 mm in diameter, about 1 mm high, the second a little larger, the third about 2 mm in diameter and about as long, distinctly 4-toothed, the others irregularly toothed. Calyx somewhat swollen in the middle, the base acute, 3 mm in diameter, 5 to 6 mm long, the limb irregularly 4-toothed, slightly villous. Petals 4, valvate, thickly

coriaceous, shining, the tube about 1 mm long, the lobes lanceolate, acuminate, 3.5 mm long, each very densely villous at the base inside, alternating with the 1 mm long anthers. Ovary 4-celled. Young fruit narrowly ellipsoid.

LUZON, Province of Tayabas, Sinaloan trail, *Bur. Sci. 9484 Robinson*, August, 1909, in forests, altitude about 200 meters.

Very distinct from the other species in the genus, well characterized by being nearly glabrous and by its few-nerved leaves.

RANDIA Linnaeus

RANDIA BAKERI sp. nov.

Frutex scandens, glaber, inerme; foliis coriaceis, oblongo-lanceolatis, rectis vel leviter falcatis, usque ad 16 cm longis, sursum sensim angustatis, acuminatis, basi distincte inaequilateralibus, haud auriculatis, nervis utrinque circiter 7, subtus distinctis, curvatis; cymis axillaribus, circiter 3 cm longis, floribus parvis, racemose dispositis, calycibus truncatis, deorsum angustatis, circiter 4 mm longis.

An unarmed, entirely glabrous, scandent shrub, the branches terete, reddish-brown, the ultimate ones 3 mm in diameter or less, smooth. Leaves coriaceous, very smooth and shining, oblong-lanceolate, 12 to 16 cm long, 3 to 4.5 cm wide, gradually narrowed upward to the acuminate apex, straight or somewhat falcate, the base distinctly inequilateral, rounded on one side, subacute on the other, not at all auriculate; lateral nerves about 7 on each side of the midrib, distinct on the lower surface, curved, very obscurely anastomosing, the primary reticulations very lax, indistinct, the others quite obsolete; petioles 1 cm long or less; stipules oblong-ovate, obtuse or coarsely apiculate, about 4 mm long. Cymes axillary and in the axils of fallen leaves, 3 cm long, shortly peduncled, with few branches, the flowers 20 or fewer on each infloresecence, their pedicels about 3 mm long, each subtended by a small bracteole. Calyx about 4 mm long, truncate, narrowed below to the acute base, less than 2.5 mm in diameter. Corolla tube apparently short, the lobes, in bud, at least 5 mm long. Anthers 4 mm long. Ovules numerous.

LUZON, Province of Tayabas, hills near Malinao, *C. F. Baker 3253*, May 7, 1914.

A species manifestly allied to *Randia auriculata* (Wall.) K. Sch., but with entirely differently shaped leaves which are not at all auriculate at the base, although distinctly inequilateral.

RANDIA GRACILIFLORA sp. nov.

Arbor inermis, circiter 18 m alta, partibus junioribus inflorescentiisque ferrugineo-pubescentibus; foliis oblongis ad ellipticis, in paribus plus minusve inaequalibus, chartaceis, acumina-

tis, basi acutis vel obtusis, usque ad 13 cm longis, nervis utrinque circiter 9 prominentibus; inflorescentiis axillaribus subterminalibusque, ferrugineo-pubescentibus, pedunculatis, cymosis, sublaxis, usque ad 8 cm diametro; floribus cylindraceis, brevissime pedicellatis, plus minusve confertis, circiter 2.5 cm longis, extus pubescentibus.

An unarmed tree about 18 m high, the branches terete, very dark-brown or nearly black when dry, glabrous, the branchlets more or less ferruginous-pubescent with appressed hairs, as are the petioles and inflorescences. Leaves opposite, those of each pair somewhat unequal in size, chartaceous, elliptic to oblong, narrowed above to the acuminate apex and below to the acute or obtuse base, 9 to 13 cm long, 3.5 to 6 cm wide, the upper surface quite glabrous, dark-olivaceous, shining when dry, the lower very slightly paler, slightly shining, glabrous, or when young with scattered hairs; lateral nerves about 9 on each side of the midrib, prominent, curved-anastomosing, the primary reticulations distinct, subparallel; petioles densely ferruginous-pubescent, 3 to 5 mm long; stipules short, more or less pubescent. Cymes axillary and subterminal, peduncled, rather open, including the flowers up to 8 cm in diameter, the peduncles about 1 cm long, and with the branches, pedicels, bracts, and calyces more or less densely ferruginous-pubescent. Flowers slender, cylindric, white, fragrant, about 2.5 cm long, their pedicels short, stout, somewhat crowded at the ends of the branchlets. Calyx cylindric, somewhat narrowed below, about 7 mm long, 3 mm in diameter, the limb somewhat produced and densely ferruginous-villous inside, the teeth 5, linear, stiff, 1.5 to 2.5 mm long, blunt. Corolla slender, cylindric, externally appressed pubescent with short, grayish-brown hairs, about 2 cm long, 1.5 to 2 mm in diameter; lobes 5, spreading, narrowly lanceolate, blunt, 8 to 10 mm long, 2 mm wide, somewhat narrowed below, pubescent externally. Anthers inserted in the upper part of the corolla, included, linear, 6 to 7 mm long. Fruit unknown.

MINDANAO, Province of Misamis, Mount Malindang, *For. Bur. 17988 Miranda*, February 26, 1913, in forests along streams, altitude 120 meters.

A caracteristic species, readily recognized by its slender, tubular flowers which are arranged in comparatively few-flowered, peduncled cymes, sometimes, however, up to 25 flowers in a cyme, its leaves in somewhat unequal pairs, and its very short petioles.

GARDENIA Linnaeus

GARDENIA LAGUNENSIS sp. nov.

Species *G. merrillii* simillima et affinis, differt foliis oblanceolatis ad obovato-oblanceolatis, minoribus, 7 ad 11 cm longis,

2 ad 4.5 cm latis, nervis latioribus paucioribus, utrinque 5 ad 7, floribus minoribus, petalis circiter 1.5 cm longis.

A small tree, entirely glabrous or the very young branchlets slightly pubescent. Branches and branchlets terete, slender, the branches grayish, the branchlets usually black when dry. Leaves numerous, opposite, coriaceous or subcoriaceous, oblanceolate to obovate-oblanceolate, 7 to 9 cm long, 2 to 4.5 cm wide, the apex acuminate, the acumen blunt, base narrowed, acute, the upper surface strongly shining when dry, blackish, the lower paler, slightly shining; lateral nerves 5 to 7 on each side of the midrib, slender, anastomosing, the reticulations not prominent, lax; petioles 5 to 10 mm long; stipules broad, short, somewhat apiculate, about 2 mm long. Flowers apparently white, black when dry, axillary, solitary and in few-flowered cymes, the pedicels short. Calyx 6 to 7 mm long, somewhat narrowed below, sharply 5-toothed, the teeth about 1.5 mm long, the inside at the apex hirsute. Corolla-tube slender, cylindric, 7 to 8 cm long, the lobes 5, oblong, obtuse, about 1.5 cm long, spreading. Fruit ovoid or ellipsoid, smooth, black when dry, 3 to 5 cm long, crowned by the short acute calyx-teeth. Seeds numerous, irregular, elliptic to ovate, about 6 mm long.

LUZON, Province of Laguna, hills back of Paete, *C. F. Baker 3176* (type), April 10, 1914, in flower; San Antonio, *Bur. Sci. 14934 Ramos*, June, 1914, *Phil. Pl. 1401 Ramos*, March, 1913, in fruit.

This species is manifestly allied to *Gardenia merrillii* Elm., but is readily distinguished by its vegetative characters and its more slender flowers which have much smaller corolla-lobes.

GARDENIA NEGROSENSIS sp. nov.

Species *G. merrillii* Elm. affinis, differt subtus foliis minute sed distincte puberulis, haud glabris, inflorescentiis calycibusque dense ferrugineo-pubescentibus.

A shrub or small tree 5 to 12 m high, the branches terete, slender, glabrous, usually nearly black when dry, the branchlets usually puberulent. Leaves opposite, chartaceous to subcoriaceous, oblong or oblong-lanceolate to ovate, 12 to 23 cm long, 5 to 10 cm wide, narrowed above to the acuminate apex and below to the acute base, the upper surface glabrous, strongly shining, greenish-olivaceous to nearly black when dry, the lower surface minutely puberulent with soft, erect, very short hairs; lateral nerves about 8 on each side of the midrib, distant, curved, anastomosing, distinct; petioles 5 mm long or less; stipules broadly ovate, pubescent, 3 to 4 mm long. Flowers showy, white, fragrant, about 7 cm long, axillary and subterminal, usually three flowers together, fascicled, or on a very short, 3-branched,

densely pubescent inflorescence, the bracts broadly ovate, pubescent, obtuse to acute, 2 mm in diameter. Calyx 8 mm long, narrowly funnel-shaped, pubescent, the limb produced above the ovary, usually 6-toothed, the teeth triangular-ovate, acute, about 1 mm long. Corolla-tube glabrous, 6 to 7 cm long, slightly widened upward, 3 mm in diameter or less; lobes spreading, elliptic, up to 2.5 cm long, 2 cm wide, broadly rounded. Anthers inserted in the upper part of the corolla-tube, included, linear, 1 cm long. Fruit black when dry, subglobose to ovoid, up to 2.5 cm in diameter, the pericarp crustaceous, glabrous, or when young more or less ferruginous-pubescent near the apex. Seeds numerous, black, irregular, suborbicular to rounded-triangular, more or less compressed, about 8 mm in diameter.

NEGROS, vicinity of Cadiz and the Gimagaan River, *For. Bur. 4204, 4245, 5569, 7255* (type) *7305 Everett*, flowering in April and May, *For. Bur. 19089, 22669 Curran, Bur. Sci. 7333 Celestino, Whitford 1613.*

A species very similar to *Gardenia merrillii* Elm., of Borneo, Palawan, the Calamianes Islands, and Mindoro, differing in its ferruginous-pubescent inflorescences and calyces, and in its leaves being minutely but distinctly puberulent on the lower surface.

GARDENIA PUBIFOLIA sp. nov.

Species *G. morindaefoliae* Elm. affinis, differt ramulis inflorescentiis foliisque dense molliter pubescentibus.

A shrub or small tree, the branches terete, reddish-brown or grayish, glabrous, the branchlets densely and softly pubescent. Leaves ovate, subcoriaceous, black when dry, somewhat shining, 7 to 12 cm long, 4 to 5.5 cm wide, acuminate, base rounded to acute, softly pubescent with short hairs, the upper surface sparingly, the lower densely so, the pubescence denser on the midrib and nerves; petioles densely pubescent, 1 cm long or less; lateral nerves 10 to 12 on each side of the midrib, fairly prominent. Cymes in the uppermost axils among the crowded leaves, pubescent, 2 cm long or less, few-flowered. Flowers 5-merous. Calyx about 7 mm long, somewhat pubescent, narrowed below to the acute base, the limb produced, with 5, narrow, acuminate, 1.3 mm long teeth. Corolla-tube 6 mm long, 3 mm in diameter, cylindric, pubescent on both surfaces, the lobes spreading, imbricate, broadly ovate, apparently acuminate, at least 5 mm long. Young fruit ellipsoid, 2 cm long, black and shining when dry, glabrous, crowned by the persistent calyx-tube, 1-celled.

MINDANAO, District of Davao, Mati, *Bur. Sci. 19343 Wester*, August 19, 1912, near the seashore.

Manifestly very closely allied to *Gardenia morindaefolia* Elm., which it greatly resembles, differing in its dense soft pubescence.

TRICALYSIA A. Richard

TRICALYSIA FASCICULIFLORA (Elm.) comb. nov.

Randia fasciculiflora Elm. Leafl. Philip. Bot. 1 (1906) 31.
Diplospora fasciculiflora Elm. l. c. 3 (1911) 1007.

This species is apparently closely allied to *Tricalysia singularis* (Korth.) K. Sch., and may prove not to be specifically distinct. It is represented by *Elmer 6900* (type), *For. Bur. 1507, 3320 Ahern's collector, For. Bur. 5138 Curran, Whitford 1306, For. Bur. 3113 Meyer, Bur. Sci. 6177 Robinson, Vanoverbergh 1124, Loher 6374, 6417*, and *Williams 607, 1393, 1472*.

Var. **OBLONGIFOLIA** var. nov.

A typo differt foliis majoribus, oblongis, usque ad 18 cm longis, nervis magis numerosis, circiter 10 utrinque, subtus in axillis glandulosis barbatisque.

LUZON, Province of Rizal, *Bur. Sci. 1117 Ramos* (type), July, 1906, *For. Bur. 2266 Ahern's collector*, September, 1905.

TRICALYSIA PUBERULA sp. nov.

Frutex vel arbor parva, subtus foliis ramulis inflorescentiisque plus minusve pubescentibus; foliis oblongis ad late oblongo-lanceolatis, chartaceis, usque ad 20 cm longis, acuminatis, basi acutis, nervis utrinque circiter 12, prominentibus; cymis axillaribus, confertis, cum floribus 1 ad 1.5 cm longis, paucifloris; floribus circiter 7 mm longis; ovulis solitariis.

A shrub or small tree, the branches grayish-brown, terete, the younger ones and the branchlets more or less cinereous-pubescent. Leaves oblong to broadly oblong-lanceolate, chartaceous, about 20 cm long, 4.5 to 5.5 cm wide, about equally narrowed to the somewhat acuminate apex and to the acute base, the upper surface dark-olivaceous when dry, shining, slightly pubescent along the midrib, the lower surface pale, somewhat shining, distinctly pubescent on the midrib and nerves, slightly pubescent on the lamina, the axils not bearded; petioles pubescent, about 1 cm long; stipules linear-lanceolate, pubescent, about 7 mm long, long-acuminate. Inflorescence of short, crowded, fascicled, pubescent, few-flowered cymes which, including the flowers, are 1.5 cm long or less, the bracts broadly ovate, acuminate, about 2 mm long, the bracteoles similar, more or less united, the pedicels very short. Calyx pubescent, about 2.5 mm long, the limb produced about 1 mm, 4-toothed. Corolla-tube 4 mm long, glabrous outside, villous within, the lobes 4, imbricate, twisted, broadly ovate, acute, 4 mm long. Anthers 2.5 mm long. Ovary 2-celled, ovules solitary, subpendulous; style 6 mm long, the two arms 1.5 mm in length.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 20431 Ramos*, February, 1913.

A species allied to *Tricalysia negrosensis* Elm., which it greatly resembles, differing in its somewhat longer, more numerously nerved leaves which are not bearded in the axils on the lower surface. The species is anomalous in *Tricalysia* in its 1-ovuled cells of the ovary, but in spite of this character I have little hesitation in referring it to this genus.

PLECTRONIA Linnaeus

PLECTRONIA SARCOCARPA sp. nov.

Frutex 4 ad 5 m altus, spinosus, ramis partibus junioribusque adpresse hirsutis; foliis ovatis, chartaceis, acuminatis, usque ad 5.5 cm longis, spinis axillaribus gracilis, rectis, usque ad 1 cm longis; fructibus axillaribus, solitariis, breviter pedunculatis, carnosis, obovoideis, 2 cm longis.

A spiny shrub 4 to 5 m high, the branches and younger parts more or less appressed-hirsute. Branches slender, the solitary axillary spines straight, sharp, stiff, slender, up to 1 cm long. Leaves chartaceous, ovate, 2.5 to 5.5 cm long, 1.2 to 3 cm wide, sharply acuminate, the base acute to rounded, green when dry, slightly pubescent along the midrib and lateral nerves, becoming nearly glabrous; lateral nerves 4 to 6 on each side of the midrib, slender, arcuate, anastomosing; petioles somewhat appressed-hirsute, 2 to 3 mm long; flowers not seen. Fruits axillary, solitary, obovoid, glabrous, the pericarp fleshy, dark-colored and shining when dry, 2 cm long, the pyrenes bony, the peduncles 3 to 4 mm long.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 10968 Ramos*, August, 1910, in thickets.

A species in most respects similar to *Plectronia horrida* Kurz and *P. peduncularis* Elm., differing from both in its much lager fruits and larger leaves.

TIMONIUS DeCandolle

TIMONIUS CONFERTIFLORUS sp. nov.

Arbor parva, 6 ad 7 m alta, partibus junioribus inflorescentiisque adpresse fulvo-pubescentibus, subtus foliis plus minusve pubescentibus; foliis oppositis, oblongis ad oblongo-ellipticis, coriaceis, in siccitate brunneis, nitidis, usque ad 9 cm longis, utrinque subaequaliter angustatis, apice breviter acute acuminatis, basi acutis, nervis utrinque 6 vel 7; cymis axillaribus, cum floribus usque ad 2 cm longis, brevissime pedunculatis vel subsessilibus, circiter 7-floris, floribus confertis, circiter 12 mm longis, 5-meris.

A small tree 6 to 7 m high. Branches terete, grayish or grayish-brown, somewhat wrinkled when dry, glabrous, the very young branchlets appressed fulvous-pubescent as are the in-

florescences. Leaves opposite, coriaceous, brown and somewhat shining when dry, oblong to oblong-elliptic, 6 to 9 cm long, 2 to 4 cm wide, subequally narrowed to the acutely acuminate apex and to the acute base, the upper surface quite glabrous, the lower minutely pubescent, the midrib and lateral nerves with longer, more prominent, appressed hairs; lateral nerves 6 or 7 on each side of the midrib, slender but distinct, curved-ascending, the reticulations obscure; petioles about 5 mm long. Inflorescences axillary, solitary or somewhat fascicled, appressed fulvous-pubescent, including the flowers 2 cm long or less, subsessile or shortly peduncled, the peduncles never exceeding 3 mm in length, dichotomously branched, bearing one central flower, each of the two branches usually with 3 flowers, all sessile. Flowers white, 5-merous. Calyx cup-shaped, appressed pubescent externally, 3.5 to 4 mm long, 2.5 to 3 mm in diameter, obscurely 5-toothed, the subtending bracteoles oblong-lanceolate, acuminate, 1.5 to 2 mm long. Corolla-tube about 10 mm long, rather slender, externally densely appressed fulvous-pubescent, the lobes oblong, obtuse, 5.5 mm long, 2 mm wide. Anthers about 4 mm long.

SAMAR, Yabong, *Phil. Pl. 1698 Ramos*, March 16, 1914, in dry thickets.

The alliance of this species seems to be with *Timonius gammilii* Elm., but it is entirely different in its inflorescence. It is well characterized by its somewhat crowded, sessile or very shortly peduncled flowers, the cymes usually 7-flowered, with but two branches.

TIMONIUS FERRUGINEUS sp. nov.

Arbor 8 ad 10 m alta, ramulis stipulis subtus foliis inflorescentiisque dense ferrugineo-pubescentibus; foliis oppositis, oblongo-obovatis ad obovatis, usque ad 25 cm longis, coriaceis, sessilis, basi angustatis rotundatisque, apice obtusus vel rotundatis, nervis utrinque 10 ad 12, prominentibus; cymis axillaribus, pedunculatis, 2-ramosis, floribus 5-meris, omnibus sessilibus, calycis distincte 5-dentatis.

A tree 8 to 10 m high, most parts rather densely ferruginous-pubescent. Branches stout, terete or compressed, more or less pubescent. Leaves opposite, sessile or subsessile, oblong-obovate to obovate, 20 to 25 cm long, 9 to 15 cm wide, rounded or obtuse, base narrowed, abruptly rounded, the upper surface dark-brown and shining when dry, the lower much paler; lateral nerves 10 to 12 on each side of the midrib, very prominent, anastomosing, the reticulations subparallel, distinct; stipules ovate, acuminate, pubescent, 2 cm long. Inflorescence axillary, solitary, rather many flowered, ferruginous-pubescent, the peduncles 3 to 4 cm

long, each bearing usually two spreading branches 2 to 4 cm in length. Flowers white, 5-merous, all sessile, borne serially on the upper side of the branches. Calyx about 6 mm long, 5 mm in diameter, irregularly and prominently toothed, the teeth usually 5, acute, externally densely ferruginous-pubescent, the subtending bracteoles oblong, 5 mm long. Corolla externally pale-pubescent, 13 to 18 mm long, the lobes oblong, about 6 mm long.

PALAWAN, Taytay, in forests immediately back of the mangrove, *Merrill 9210*, April 30, 1913.

A species well characterized by its ferruginous indumentum, its large, oblong-obovate to obovate, obtuse or rounded, prominently nerved, sessile leaves. It is most closely allied to *Timonius macrophyllus* Merr., but is very different from that species.

TIMONIUS QUINQUEFLORUS sp. nov.

Frutex vel arbor parva, subglabra, partibus junioribus inflorescentiis parce pubescentibus; foliis oppositis oblongis, coriaceis, petiolatis, usque ad 12 cm longis, acuminatis, basi acutis, nervis utrinque 5 vel 6, subtus prominentibus, in siccitate brunneis vel flavido-brunneis; cymis axillaribus, pedunculatis, 5-floris, floribus sessilibus, parvis, calycis truncatis.

A shrub or small tree, the older parts quite glabrous, the very young branchlets, stipules, and inflorescence somewhat appressed ferruginous-pubescent. Leaves opposite, oblong, coriaceous, when dry brown or yellowish-brown, somewhat shining on the upper surface, paler beneath, 7 to 12 cm long, 2 to 4 cm wide, subequally narrowed to the acute base and to the somewhat acuminate apex, the lower surface bearded in the axils and, when young, with scattered hairs; lateral nerves 5 or 6 on each side of the midrib, rather prominent, ascending, anastomosing, the reticulations rather fine, distinct; petioles stout, about 3 mm long; stipules ovate, acuminate, pubescent, 3 mm long, deciduous. Inflorescence axillary, solitary, somewhat pubescent, 3 to 5 cm long, the peduncles 2 to 3.5 cm long, bearing at their apices a solitary, central flower and two branches, each branch with two flowers. Flowers white. Calyx cup-shaped, truncate or very minutely 4-toothed, narrowed below, about 4 mm long, 3 mm in diameter, somewhat pubescent. Corolla-tube pubescent, 7 to 8 mm long, the lobes 4, very thick, oblong, obtuse, 5 mm long.

LUZON, Province of Tayabas, Guinayangan, *Bur. Sci. 20885 Escritor*, March 8, 1913.

A species well characterized by its uniformly 5-flowered inflorescences.

PAVETTA Linnaeus

PAVETTA BAKERI sp. nov.

Frutex, fructibus exceptis hirsutus; foliis subcoriaceis, anguste oblongo-ellipticis ad anguste oblongo-obovatis, usque ad 23 cm longis, in siccitate subnigris, acuminatis, basi angustatis, acutis, supra papillatis, nervis utrinque 8 vel 9, prominentibus; inflorescentiis trifidis, dense hirsutis, corollae tubo circiter 1 cm longo.

A shrub, all parts, except the fruit, prominently hirsute. Branches terete, spreading-hirsute, the hairs brownish. Leaves somewhat blackish when dry, subcoriaceous, narrowly oblong-elliptic to narrowly oblong-obovate, 12 to 23 cm long, 4 to 8 cm wide, apex acuminate, base narrowed, acute, both surfaces prominently hirsute with spreading hairs especially on the midrib and lateral nerves, the hairs on the upper surface from rather prominent papillae; lateral nerves 8 or 9 on each side of the midrib, prominent, curved-ascending, anastomosing, the reticulations lax, prominent, both the nerves and the reticulations impressed on the upper surface; petioles hirsute, 1 to 2.5 cm long; stipules lanceolate, acuminate, about 1.5 cm long. Inflorescence terminal, peduncled, trifid, about 9 cm long, densely hirsute with spreading hairs, the flowers crowded on the ultimate branchlets. Flowers white, the bracts and bracteoles lanceolate, acuminate, hirsute, the former 3 to 4 mm long, the latter similar but shorter. Calyx densely hirsute, ovoid, 4 mm long, the teeth lanceolate, 1 mm long, the pedicels about 5 mm in length. Corolla-tube 1 cm long, pubescent, the lobes spreading, oblong, about 7 mm long, 2 mm wide, obtuse, pubescent on the exposed parts externally. Anthers linear-lanceolate, 6 mm long. Style exserted about 1.4 cm. Fruit globose or ovoid, wrinkled and nearly black when dry, about 8 mm long, glabrous except the hirsute tip.

LUZON, Province of Laguna, hills back of Paete, *C. F. Baker 3214* (type), April 10, 1914, in flower; San Antonio, *Bur. Sci. 21990 Ramos*, October, 1913, in damp forests, in fruit.

A very characteristic species in the alliance with *Pavetta indica* Linn., strongly marked by its hirsute indumentum and its prominently nerved and reticulated leaves which are distinctly papillate on the upper surface.

PAVETTA PALAWANENSIS Elm. Leafl. Philip. Bot. 4 (1912) 1344.

Frutex circiter 2 m altus; foliis lanceolatis ad oblongo-oblanceolatis, in siccitate subnigris, chartaceis vel submembranaceis, usque ad 28 cm longis, acuminatis, basi angustatis, acutis, supra minute scaberulis, subtus molliter villosis, nervis utrinque

7 ad 11, subtus valde prominentibus, curvato-adscendentibus, reticulis laxis, distinctis; inflorescentiis axillaribus terminalibusque, usque ad 12 cm longis, dense multifloris, plus minusve hirsutis, corollae tubo glabro, circiter 2 cm longo.

A shrub about 2 m high, the leaves blackish when dry. Branches terete, dark-colored when dry, more or less pubescent with short hairs. Leaves chartaceous to submembranaceous, lanceolate to oblong-oblanceolate, 12 to 28 cm long, 3 to 9 cm wide, acuminate, base narrowed, acute, the upper surface nearly black, minutely scaberulous, the lower surface somewhat paler than the upper, rather densely and softly villous with short hairs; lateral nerves 7 to 11 on each side of the midrib, on the lower surface very prominent, curved-ascending, prominently anastomosing, the reticulations very lax; petioles 1 to 3 cm long, pubescent; stipules broadly triangular-ovate, about 5 mm long, acuminate. Inflorescence usually terminal, sometimes axillary, up to 12 cm long, densely many flowered, the flowers crowded on the ultimate branchlets, the rachis, branches, bracts, and calyces more or less villous or hirsute. Flowers white, 4-merous. Calyx ovoid, about 2.2 mm long, densely hirsute with pale hairs, the teeth triangular-ovate, acute, 0.5 mm long. Corolla-tube slender, glabrous, 2 cm long, the lobes oblong to oblong-obovate, obtuse, glabrous, about 6 mm long, 2 mm wide. Anthers linear, 5 mm long. Style glabrous, exserted about 2.2 cm.

PALAWAN, near Puerto Princesa, *Bur. Sci. 326 Bermejos*, January, 1906, *Merrill 759*, February, 1903, *For. Bur. 3516 Curran*, January, 1906, *Bur. Sci. 782 Foxworthy*, April 20, 1906, in forests, sea level to about 300 meters altitude.

This form has been referred to *Pavetta indica* Linn., from which, however, it is abundantly distinct although manifestly belonging in the same general group. Characteristic features are its leaves scaberulous on the upper surface and shortly villous beneath, its prominent nerves, its densely arranged flowers, the calyx small, hirsute, the corolla slender, glabrous, the tube about 2 cm long. The species was based on *Elmer 12940*, from Palawan, but the original description is unsatisfactory. Working from the description alone I at first decided that the form above described was specifically distinct, but am now of the opinion that the original description was based on specimens with immature flowers, otherwise, if I am correct in referring the above specimens to *Pavetta palawanensis*, I cannot account for the description of the corolla as having the "basal one third tubular, otherwise divided into 4 oblong segments." Neither the length of the corolla nor that of the segments is indicated, while the style is described as being but 1 cm long.

PAVETTA SCABERULA sp. nov.

Frutex 2 ad 3 m altus, subtus foliis ad costa nervisque inflorescentiisque dense hirsutus; foliis chartaceis vel subcoriaceis,

oblongo-obovatis, usque ad 20 cm longis, apice acute acuminatis, basi acutis, pagina superiore nitidis, scaberulis; nervis lateralibus utrinque circiter 12, subtus prominentibus; inflorescentiis circiter 7 cm longis, trichotomis, paucifloris, floribus confertis, circiter 2.5 cm longis.

A shrub 2 to 3 m high, the branches terete or the younger ones somewhat compressed, rather densely hirsute with short spreading hairs as are the midribs and nerves on the lower surfaces of the leaves and the inflorescence, indumentum rather pale. Leaves oblong-obovate, chartaceous or subcoriaceous, olivaceous when dry, shining, about 20 cm long, 8 to 9 cm wide, sharply acuminate, base acute, the upper surface distinctly scaberulous, otherwise nearly glabrous except the sparingly pubescent midrib, the lower surface rather prominently hirsute on the midrib nerves and reticulations with short spreading hairs; lateral nerves about 12 on each side of the midrib, prominent, somewhat ascending, anastomosing, the reticulations lax; petioles 2.5 to 3.5 cm long, short-hirsute; stipules triangular-oblong-lanceolate, acuminate, hirsute, about 1 cm long. Inflorescence about 7 cm long, peduncled, trichotomously branched, densely pale-hirsute, the flowers rather few, crowded on the ultimate branchlets. Calyx hirsute, about 3 mm long, the teeth lanceolate, 1.5 mm long. Corolla-tube hirsute with short spreading hairs, about 1 cm long, the lobes linear-oblong, obtuse, about 12 mm long and 3 mm wide, sparingly hirsute on the exposed dorsal parts. Anthers linear, 10 to 11 mm long. Style exserted about 1.7 cm, slightly hirsute.

LUZON, Province of Tayabas, Dayap, *Bur. Sci. 13114 Foxworthy & Ramos*, March 9, 1911, in forests, altitude about 30 meters, flowers white.

This species belongs in the *Pavetta indica* group and its alliance is with *P. bakeri* Merr. It differs from both species in its more numerously nerved leaves which are scaberulous on the upper surface, and from the latter especially in its leaves being not at all papillate on the upper surface, the reticulations being not at all impressed, and the nerves being but very slightly so. There are also many differences in the shape of the leaves and in details of the inflorescence and flowers.

IXORA Linnaeus

IXORA GRACILIPES sp. nov.

Frutex glaber circiter 5 m altus; foliis oblongis ad oblongo-oblanceolatis, coriaceis, nitidis, usque ad 10 cm longis, obtusis, acutis, vel obscure acuminatis, basi angustatis, cuneatis vel decurrento-acuminatis, nervis primariis patulis, obscuris, circiter 13 utrinque, anastomosantibus; inflorescentiis terminalibus et in axillis superioribus, gracilis, paucifloris, longe graciliter

pedunculatis circiter 9 cm longis; fructibus 8 ad 10 mm diametro.

A glabrous shrub about 5 m high, the branches brownish or olivaceous, terete, brownish or pale-olivacous, the younger ones shining, 2.5 mm in diameter. Leaves oblong to oblong-oblanceolate, coriaceous, 7 to 10 cm long, 2 to 3 cm wide, brownish or olivaceous, smooth, shining, the lower surface a little paler than the upper, the margins somewhat revolute, the apex obtuse, acute, or slightly acuminate, narrowed in the lower one-third or one-half to the cuneate or somewhat decurrent-acuminate base; lateral nerves slender, spreading at nearly right angles, obscure, about 13 on each side of the midrib, obscurely anastomosing, the reticulations lax, subobsolete; petioles 2 to 3 mm long; stipules about 2 mm long, surrounding the stem, truncate. Inflorescence terminal and in the upper axils, solitary, slender, apparently pendulous, 3- to 7-flowered, about 9 cm long, the very slender peduncles 5 to 7 cm long, the few branches 2 cm long or less, the bracteoles very small. Fruit brown when dry, subglobose, shining, 8 to 10 mm in diameter, the persistent calyx-teeth very short.

LUZON, Province of Tayabas, Mount Cadig, near Guinayangan, *Bur. Sci. 20723* (type), *20824 Escritor*, March, 1913.

A species well characterized by its obscurely nerved leaves, the nerves spreading at nearly right angles, its truncate stipules, and its very slender, apparently pendulous, few-flowered inflorescences.

IXORA PLATYPHYLLA sp. nov.

Arbor parva circiter 7 m alta, inflorescentiis leviter pubescentibus exceptis glabra; foliis petiolatis, late elliptico-ovatis, circiter 25 cm longis, coriaceis, obtusis vel subrotundatis, basi late rotundatis, nervis utrinque circiter 14, prominentibus; inflorescentiis terminalibus, trifidis, latis, circiter 12 cm longis, floribus plus minusve confertis, ut videtur brevibus, calycis dentibus brevibus; fructibus 5 ad 8 mm diametro.

A small tree, about 7 m high, except the inflorescence. Branches terete or somewhat compressed, the ultimate ones about 5 mm in diameter, grayish, smooth. Leaves broadly elliptic-ovate, coriaceous, about 25 cm long, 12 to 15 cm wide, apex obtuse or rounded, base broadly rounded, rather pale and slightly shining when dry; lateral nerves about 14 on each side of the midrib, prominent on the lower surface, anastomosing, the reticulations rather coarse, distinct; petioles stout, about 1.5 cm long; stipules oblong-ovate, coriaceous, about 1 cm long. Inflorescence terminal, ample, about 12 cm long, trifid, the basal branches two, spreading, about 9 cm long, the flowers somewhat

crowded near the ends of the branches, the flower-bearing portions 2.5 to 5 cm long, 4 to 8 cm wide, the axis, branches, and branchlets slightly pubescent, the bracteoles none or very early deciduous. Calyx somewhat urceolate, 2 mm long, the teeth 4, very short. Corolla, in bud, 5 mm long. Fruit subglobose, glabrous, 5 to 8 mm in diameter.

MINDANAO, District of Cotabato, Glan, *For. Bur. 18250 Miranda*, June, 1912.

A species well characterized by its very broad leaves and its terminal trifid inflorescence, the small flowers crowded near the ends of the primary branches. Its alliance seems to be with *Ixora grandifolia* Z. & M.

IXORA SAMARENSIS sp. nov.

Frutex vel arbor parva, glabra; foliis oblongis, coriaceis, usque ad 25 cm longis, breviter petiolatis, obtusis vel obscure late acuminatis, basi subtruncato-rotundatis, nervis utrinque circiter 15, subtus prominentibus; stipulis abrupte longe setaceo-apiculatis; inflorescentiis axillaribus terminalibusque, circiter 20 cm longis, ramis paucis, patulis, paucifloris; fructibus 6 ad 9 mm diametro.

A shrub or small tree, glabrous, the branches terete or somewhat compressed, pale-brownish, smooth, the ultimate ones about 5 mm in diameter. Leaves oblong, coriaceous, 20 to 25 cm long, 7 to 9 cm wide, brownish when dry, shining, the apex obtuse or broadly and obscurely acuminate, base subtruncate-rounded or sometimes sligthly cordate; lateral nerves about 15 on each side of the midrib, very prominent on the lower surface, anastomosing, the reticulations lax; petioles stout, 1 cm long; stipules broad, sheathing the stems, about 3 mm long, truncate, bearing a terminal, awnlike apiculus 5 to 7 mm long. Inflorescence terminal and axillary, solitary, glabrous or very obscurely pubescent, 12 to 20 cm long, long-peduncled, branched only in the upper part, the branches spreading at right angles, 6 to 8 cm long, few-flowered. Fruits subglobose, 6 to 9 mm in diameter. The inflorescences are usually subtended by bract-like leaves 1 to 5 cm in length, lanceolate to broadly ovate.

SAMAR, Catbalogan, *Bur. Sci. 15399 Ramos*, July, 1912.

A species well characterized by its large, prominently nerved leaves, short petioles, truncate, and prominently setaceous-apiculate stipules, and its long, peduncled, few-flowered inflorescences, the branches spreading at about right angles.

PSYCHOTRIA Linnaeus

The genus *Psychotria*, as interpreted by Bentham & Hooker f. is represented in the Philippines by very numerous species. In many cases the various species are remarkably distinct, in

others the forms are separated only by slight, although apparently constant characters. In habit our species are undershrubs, shrubs, vines, and trees, and they may be entirely glabrous, or from slightly to densely pubescent. They occur to a limited degree in the open settled areas, but chiefly in the forested regions, and extend from sea level to an altitude of nearly or quite 2,500 meters. A very few species are of wide distribution in the Archipelago, but the bulk of them are of decidedly local occurrence, and most of them are endemic. The genus is so large that it is decidedly inconvenient properly to consider the numerous forms, and after a careful consideration I have deemed it expedient to recognize the genus *Grumilea* Gaertner for those species which have seeds with ruminate albumen. Following Valeton and Ridley, I consider it also expedient to segregate the genus *Streblosa* Korthals, the species falling in this genus being entirely different from those of *Psychotria* and *Grumilea* in habit, in their minute fruits, and in their constantly lateral inflorescences. In consideration of the recognition of *Grumilea* as a distinct genus, it has become necessary to rearrange our numerous Philippine forms that have previously been referred to *Psychotria*. In the following arrangement I have limited *Psychotria* to the species having seeds with the albumen not at all ruminate, and using this character as a distinguishing one we still have plants of very diverse habit and appearance, undershrubs, shrubs, vines, and small trees, with fruits, pyrenes, and seeds varying from entirely smooth to deeply sulcate or ridged. The following list includes the species that, from the character of the albumen, can be referred to *Psychotria* proper.

In the course of this study I have been able to eliminate from the Philippine flora the genus *Coelospermum*, *C. ahernianum* Elm. being *Psychotria leptothyrsa* Miq., as previously determined by Valeton by citation of a cotype of Elmer's species, and two species of *Amaracarpus*, *A. pubescens* Elm., non Blume being *Grumilea amaracarpoides* Merr., and *A. longifolius* Elm. being a synonym of *Psychotria linearis* Bartl., as already noted by Mr. Elmer.

PSYCHOTRIA LIANOIDES Elm. Leafl. Philip. Bot. 3 (1911) 1029.

MINDANAO, *Elmer 11645*.

The alliance of this species is with *P. diffusa* Merr.

PSYCHOTRIA OVALIS Elm. Leafl. Philip. Bot. 3 (1911) 1023.

MINDANAO, *Elmer 10567*.

PSYCHOTRIA SARCOCARPA Merr. in Philip. Journ. Sci. 8 (1913) Bot. 53.

MINDANAO, *Merrill 8077*.

PSYCHOTRIA EPIPHYTICA Elm. Leafl. Philip. Bot. 5 (1913) 1890.

MINDANAO, *Elmer 14199*.

PSYCHOTRIA CUERNOSENSIS Elm. Leafl. Philip. Bot. 2 (1908) 521.

NEGROS, *Elmer 10076*. MINDORO, *Merrill 6176* (as *P. diffusa*). MINDANAO, *Mrs. Clemens s. n.*

PSYCHOTRIA DIFFUSA Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 134.

Psychotria celastroides Elm. Leafl. Philip. Bot. 1 (1906) 24, non Griseb.

LUZON, *Whitford 152, 930, 1208, 1187, Bur. Sci. 8989 Foxworthy, Elmer 6258, 6811, Williams 1155* (?), *Bur. Sci. 2488 Mearns, Bur. Sci. 9444 Robinson, Baker 246, Bur. Sci. 16883 Servinas, Bur. Sci. 5959, 13648, 5348 Ramos*. MINDORO, *Merrill 6170, For. Bur. 4435 Merritt*. NEGROS, *Elmer 9662, Whitford 1521*.

Var. **CERVINA** Elm. Leafl. Philip. Bot. 2 (1909) 592.

Psychotria cervina Elm. l. c. 3 (1911) 1022.

NEGROS, *Elmer 9800*. Differs from the type notably in its pubescent inflorescence.

Var. **AGUSANENSIS** (Elm.) comb. nov.

Psychotria agusanensis Elm. l. c. 5 (1913) 1888.

LUZON, *For. Bur. 1974 Foxworthy, Bur. Sci. 15018 Ramos*. MINDORO, *For. Bur. 12092 Merritt*. MINDANAO, *Elmer 13667*. Differs from the species apparently only in its somewhat larger leaves.

PSYCHOTRIA LINEARIS Bartl. ex DC. Prodr. 4 (1830) 522; Miq. Fl. Ind. Bat. 2 (1856) 290; F.-Vill. Novis. App. (1880) 112; Elm. Leafl. Philip. Bot. 3 (1911) 1022.

Amaracarpus longifolius Elm. Leafl. Philip. Bot. 1 (1906) 1.

LUZON, *Haenke* in herb. Prague, *Merrill 4000, Whitford 620, For. Bur. 10201 Curran, For. Bur. 3375 Ahern's collector, Bur. Sci. 13782, 13569 Ramos, Phil. Pl. 335 Ramos*.

PSYCHOTRIA MANILLENSIS Bartl. ex DC. Prodr. 4 (1830) 522; Miq. Fl. Ind. Bat. 2 (1856) 290.

LUZON, *Haenke* in herb. Prague, *For. Bur. 1771 Borden, Bur. Sci. 9726, 17185 Robinson, Gates 5246, For. Bur. 19637, 16601, 11587, 11616 Curran, Weber 1561, Baker 255, 2678, 2683, Phil. Pl. 1043 Ramos, Holman 87, Elmer 6758, Leiberg 6008, For. Bur. 1480 Ahern's collector, Whitford 479, 510, Bur. Sci. 13957 Ramos*. BABUYANES ISLANDS, *Bur. Sci. 3648, 3908 Fénix*.

PSYCHOTRIA ELLIPTIFOLIA Elm. Leafl. Philip. Bot. 1 (196) 66.

LUZON, *Elmer 7943, 8061, Vanoverbergh 1192, Bur. Sci. 7061, 8205 Ramos*. MINDANAO, *Elmer 11503* (as *P. diffusa*).

PSYCHOTRIA IXOROIDES Bartl. ex DC. Prodr. 4 (1830) 522; Miq. Fl. Ind. Bat. 2 (1856) 290; F.-Vill. Novis. App. (1880) 112; Elm. Leafl. Philip. Bot. 3 (1911) 1021.

Psychotria sarmentosa F.-Vill. Novis. App. (1880) 112; Vid. Rev. Pl. Vasc. Filip. (1886) 157; Elm. Leafl. Filip. Bot. 1 (1906) 24; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 135, 2 (1907) Bot. 306, non Blume.

LUZON, *Haenke, Bur. Sci. 21181 Escritor, Phil. Pl. 336 Ramos, Bur. Sci. 2674, 13747 Ramos, For. Bur. 20027 Topacio, Merrill 3253, 3887, Whitford 135, 253.* POLILLO, *Bur. Sci. 10221 McGregor, Bur. Sci. 9056 Robinson.* MINDORO, *Merrill 5683, For. Bur. 9904, 11033, 12073 Merritt.* PALAWAN, *Merrill 837.* LEYTE, *Elmer 7112, Piper 502,* mostly distributed as *P. sarmentosa* Blume.

I have examined the type of Bartling's species in the Prague herbarium, and have before me an excellent carbon rubbing showing the form and venation of the leaves, with critical notes regarding indumentum, etc., and am confident that my present interpretation of the species is correct. The Prague specimen presents only immature flowers, although the fruits are described as globose. The species, as here interpreted, is very similar to *Psychotria sarmentosa* Hooker f., and perhaps is the form described under that name by Hooker. The seeds are not at all ruminate, while in *Psychotria sarmentosa* Blume the seeds are ruminate, and K. Schuman has placed Blume's species in the genus *Grumilea* as *G. sarmentosa* (Blume) K. Sch. in Engl. & Prantl Nat. Pflanzenfam. 4[4] (1891) 116.

PSYCHOTRIA MINDORENSIS Elm. Leafl. Philip. Bot. 3 (1911) 1031.

LUZON, *For. Bur. 19933 Mendoza, Bur. Sci. 13322 Ramos.* MINDORO, *McGregor 312.* SIBUYAN, *Elmer 12332.* NEGROS, *For. Bur. 13592 Meyer & Foxworthy.* LEYTE, *Wenzel 279.* MINDANAO, *Bur. Sci. 15890 Fénix, Mrs. Clemens 497, s. n.*

A variable species as to leaf form, allied to *P. ixoroides* Bartl., but the leaves larger, rounded to somewhat cordate, not attenuate at the base, short-petioled.

PSYCHOTRIA MEMBRANIFOLIA Bartl. ex DC. Prodr. 4 (1830) 522; F.-Vill. Novis. App. (1880) 112.

Chasalia membranifolia Elm. Leafl. Philip. Bot. 3 (1911) 1032; 5 (1913) 1856.

This species was based on a Philippine specimen collected by Haenke, and I have examined the type in the Prague herbarium. It is well matched by numerous specimens, and in all characters is a *Psychotria* and not a *Chasalia;* the seeds are not ruminate. In *Chasalia* the pyrenes and seeds are concavo-convex, not at all ridged on the back, and lunate in cross section. Thus character does not absolutely separate *Chasalia* from *Psychotria,* the genera being further distinguished by the elongated and curved corolla-tubes in *Chasalia. Psychotria membranifolia* Bartl. is represented by the following specimens:

LUZON, Province of Ilocos Norte, *Bur. Sci. 7640 Ramos:* Province of Laguna, Los Baños, *Elmer, For. Bur. 11967 Tamesis, Baker 3359:* Province of Albay, *Bur. Sci. 6434 Robinson.* MINDORO, *For. Bur. 3662, 11382 Merritt.* NEGROS, *For. Bur. 7290 Everett, Bur. Sci. 7326 Celestino.* BILI-

RAN, *Bur. Sci. 18809 McGregor.* LEYTE, *For. Bur. 16980 Rosenbluth, Wenzel 280.* MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens 534, 1043, s. n.:* District of Zamboanga, *Hallier s. n.;* Province of Agusan, *Elmer 13389.*

The type of Bartling's species is a specimen in flower, and a very excellent carbon rubbing showing the outline of the leaf and its venation is before me. Specimens bearing both flowers and fruits, and which absolutely match Bartling's type specimen and the original description present the typical fruits of *Psychotria,* not of *Chasalia.* The mature fruits are ovoid to subellipsoid, 6 to 7 mm long, the pericarp rather prominently ridged when dry, the pyrenes plano-convex or somewhat concavo-convex, the dorsal surfaces prominently, longitudinally, about 5-ridged, the ridges rather sharp, the depressions rounded.

Var. **ELMERI** var. nov.

Chasalia rostrata Elm. Leafl. Philip. Bot. 1 (1906) 3, non Miq.

This form differs from the type in its obovate to obovate-oblong leaves which are abruptly and prominently acuminate, and its somewhat fewer nerves. In the type, that is Bartling's original specimen, there are about 15 pairs of lateral nerves; in the present form from 9 to 11 pairs, but in the material above referred to the species the nerves vary from 8 to 15 pairs.

LUZON, Province of Tayabas, Atimonan, *Merrill 4083;* Kabibihan, *Bur. Sci. 13238 Ramos;* Tagcauayan, *Bur. Sci. 13336 Ramos.*

Chasalia rostrata Miq. was credited to the Philippines by Mr. Elmer without citing any specimens; the one specimen so written up by him was *Merrill 4083.* This specimen, however, does not closely resemble *Chasalia rostrata* Miq., and is certainly a *Psychotria.*

PSYCHOTRIA CHASALIOIDES sp. nov.

Frutex circiter 1 m altus, glaber; inflorescentiis terminalibus, brevibus, breviter pedunculatis, 1 ad 2.5 cm longis, paucifloris; floribus circiter 3 mm longis; foliis membranaceis, lanceolatis ad oblongo-lanceolatis, tenuiter acuminatis, usque ad 15 cm longis, basi acutis, nervis utrinque circiter 8; fructibus carnosis, obovoideis, 8 ad mm longis, pyrenis obovoideis, apice rotundatis, basi acutis, plano-convexis, dorso distincte 3-carinato, albumine haud ruminato.

A shrub or undershrub usually about 1 m high, glabrous, the branches terete, smooth, olivaceous. Leaves lanceolate to oblong-lanceolate, membranaceous, 9 to 15 cm long, 2 to 4 cm wide, subequally narrowed to the slenderly acuminate apex and the acute base, olivaceous and somewhat shining when dry, the lower surface a little paler than the upper; lateral nerves about 8 on each side of the midrib, slender, distinct, curved, prominently anastomosing; petioles 4 to 16 mm long. Inflorescence terminal, paniculate, shortly peduncled, 1 to 2.5 cm long, few flowered, the flowers sessile, rather crowded on the few

branchlets. Calyx oblong-cylindric, base narrowed, about 2 mm long, the teeth obscure. Corolla-tube cylindric, 2 mm long, glabrous outside, villous within, the lobes spreading or reflexed, oblong-ovate, obtuse, 1.5 mm long, puberulent on the inner surface. Anthers 0.8 mm long. Style 3 mm long. Fruit red or purple when mature, the pericarp fleshy, obovoid, 8 to 9 mm long, distinctly ridged when dry. Pyrenes oblong-obovoid, plano-convex, 7 to 9 mm long, apex rounded, base acute, the back rather coarsely and prominently 3-ridged or keeled, the albumen not at all ruminate.

SIBUYAN, *Elmer 12314* (type), April, 1910, distributed as *Chasalia membranifolia*. MINDORO, Mount Halcon, *Merrill 5576;* Mount Sablayan, *For. Bur. 11028, 12090 Merritt,* in forests, from 600 to 1,800 meters altitude.

This species is manifestly allied to *Psychotria membranifolia* Bartl., from which it differs in its much narrower leaves, its more or less obovoid fruits, and its pyrenes 3-, not 5-ridged.

PSYCHOTRIA LEPTOTHYRSA Miq. Ann. Mus. Bot. Lugd. Bat. 4 (1868) 208; Valeton in Ic. Bogor. 3 (1909) 233, *t. 285*.

Psychotria beccarii K. Sch. in K. Sch. & Hollr. Fl. Kais. Wilhelmsl. (1889) 135.

Coelospermum ahernianum Elm. Leafl. Philip. Bot. 1 (1906) 3.

The reduction of *Coelospermum ahernianum* Elm. was made by Valeton, l. c. 235 by citation of the type number of Elmer's species. In checking up this number in the herbarium of the Bureau of Science it was found that Ahern 164, cited by Valeton, was a species of *Tabernaemontana*. Accordingly I wrote to Dr. Valeton, who courteously looked up the specimen and reported that he had cited *Ahern 164* by error, and that *Ahern 196* was the sheet intended; this latter number is the type collection of *Coelospermum ahernianum*.

Our specimen of *Ahern 196* agrees with Valeton's figure and description in all respects, and also agrees with Javan material in the herbarium of the Bureau of Science (cult. Hort. Bogor. III, L, 43), and determined by Valeton. The species is represented by the following Philippine material:

LUZON, Province of Camarines, *Ahern 196* (type of *Coelospermum ahernianum* Elm.), *For. Bur. 10792 Curran.* MINDANAO, Butuan Subprovince, *Weber 1008* (probably).

Java to Luzon and New Guinea.

PSYCHOTRIA MEARNSII sp. nov.

Frutex scandens, ramulis inflorescentiisque plus minusve hirsutus; foliis numerosis, oblongis, subcoriaceis, in siccitate brunneis, usque ad 2.5 cm longis, acuminatis, basi subacutis, nervis utrinque 4 vel 5; paniculis terminalibus, circiter 4 cm longis, pyramidatis, ramis primariis patulis; fructibus ovoideis, circiter 4.5 mm longis, in siccitate longitudinaliter sulcatis; seminibus plano-convexis, dorso prominente longitudinaliter 3-sulcato vel carinato, albumine aequabile.

A scandent shrub, the branchlets and panicles rather prominently hirsute with short, stiff, dark, spreading hairs. Branches terete, reddish-brown, glabrous, usually with rather numerous roots, the branchlets slender, the younger ones rather densely hirsute. Leaves numerous, rather crowded on the branchlets, oblong-ovate, subcoriaceous, 2 to 2.5 cm long, 8 to 12 mm wide, dark-brown when dry, rather brittle, glabrous, or with few scattered hairs on the lower surface, acuminate, base subacute, margins usually recurved; lateral nerves 4 or 5 on each side of the midrib, prominent on the lower surface, the reticulations subobsolete; petioles about 1 mm long, more or less hirsute. Panicles terminal, pyramidal, about 4 cm long and wide, sessile or nearly so, the branches few, spreading. Fruits ovoid or narrowly ovoid, glabrous, about 4.5 mm long, dark-brown and sulcate when dry, somewhat urceolate. Seeds flat on the inner surface, prominently longitudinally 3-sulcate or 3-keeled on the back, albumen not at all ruminate.

MINDANAO, Province of Misamis, Mount Malindang, *For. Bur. 4770 Mearns & Hutchinson* (type), May, 1906, along the Malabug River, altitude about 500 m: District of Davao, Mount Apo, *Elmer 11424*, as *P. diffusa* Merr.

The alliance of this species is with *Psychotria elliptifolia* Elm., from which it is at once distinguished by its much more prominently nerved leaves and its pubescent branchlets.

PSYCHOTRIA BALABACENSIS sp. nov.

Frutex erectus, circiter 4 m altus, glaber; foliis membranaceis, ellipticis ad oblongo-ellipticis, usque ad 14 cm longis, in siccitate pallidis, nitidis, apice abrupte breviter obtuseque acuminatis, basi decurrento-acuminatis, nervis lateralibus 7 vel 8, tenuibus; infructescentiis terminalibus, brevissime pedunculatis, laxis; fructibus circiter 9 mm longis, globoso-ovoideis ad obovoideis, laevis, pyrenis plano-convexis, laevis, albumine aequabile.

An erect glabrous shrub about 4 m high. Branches terete, reddish-brown, the branchlets slender, pale-greenish. Leaves membranaceous, pale and shining when dry, elliptic to oblong-elliptic, 9 to 14 cm long, 4.7 to 7 cm wide, apex rather abruptly, shortly, and broadly acuminate, the base somewhat decurrent-acuminate; lateral nerves 7 or 8 on each side of the midrib, slender, spreading, distant, somewhat curved, anastomosing, the reticulations very lax, obscure; petioles 1.5 to 2 cm long; stipules very broad, subacute, pale, about 3 mm long. Infructescence terminal, lax, 4 to 6 cm long, the peduncles 5 mm long or less, the branches few, elongated, slender, pale. Fruits about 9 mm

long, pale and shining when dry, smooth, globose-ovoid to somewhat obovoid, rounded, the pericarp crustaceous. Pyrenes plano-convex, smooth, not at all ridged, the young seeds obscurely keeled on the ventral surface, the albumen uniform.

BALABAC, *Bur. Sci. 21605 Escritor* (type), August, 1913. PALAWAN, Bonabona, *Bur. Sci. 21541 Escritor*, August, 1913.

This species in many characters closely approaches *Psychotria membranifolia* Bartl., but is entirely different in the characters of its infructescence and fruits. Its true alliance seems to be with *Psychotria leptothyrsa* Miq. (*Coelospermum ahernianum* Elm.), from which it is readily distinguished by its very short peduncles.

PHILIPPINE SPECIES OF PSYCHOTRIA OR GRUMILEA OF WHICH THE FRUITS ARE UNKNOWN

PSYCHOTRIA GITINGENSIS Elm. Leafl. Philip. Bot. 3 (1911) 1024.

SIBUYAN, *Elmer 12431*. Erect.

PSYCHOTRIA BONTOCENSIS Merr. in Philip. Journ. Sci. 9 (1914) Bot. 456.

LUZON, *Vanoverbergh 2610*. Erect.

PSYCHOTRIA RAMOSISSIMA Elm. Leafl. Philip. Bot. 1 (1908) 355.

LUZON, *Elmer 9178*. LEYTE, *Wenzel 693*. Scandent.

PSYCHOTRIA RAMOSII Merr. in Philip. Journ. Sci. 5 (1910) Bot. 244.

LUZON, *Bur. Sci. 7499 Ramos*.

PSYCHOTRIA SIBUYANENSIS Elm. Leafl. Philip. Bot. 3 (1911) 1028.

SIBUYAN, *Elmer 12355*. Scandent.

PSYCHOTRIA IWAHIGENSIS Elm. Leafl. Philip. Bot. 4 (1912) 1351.

PALAWAN, *Elmer 13052*. Scandent.

PSYCHOTRIA VANOVERBERGHII Merr. in Philip. Journ. Sci. 9 (1914) Bot. 457.

LUZON, *Vanoverbergh 1144, 2818*. *Erect*.

PSYCHOTRIA REPENS Elm. Leafl. Philip. Bot. 4 (1912) 1349.

PALAWAN, *Elmer 12991*. Scandent.

PSYCHOTRIA VOLUTA Elm. Leafl. Philip. Bot. 4 (1912) 1347.

PALAWAN, *Elmer 13253*. Scandent.

PSYCHOTRIA RIGIDAEFOLIA (Elm.) comb. nov.

Randia rigidaefolia Elm. Leafl. Philip. Bot. 1 (1908) 352.

The type of this species is *Elmer 9118* from Lucban, Province of Tayabas, Luzon, and so far as known it is represented only by this one collection. The species, is in all respects a *Psychotria* (or *Grumilea*) and is accordingly removed from *Randia*. In commenting on the species Mr. Elmer notes that it might be either *Psychotria* or *Randia*, but that the "more or less numerous ovules places it in the latter genus." I find the ovary to be 2-celled, with a single ovule in each cell. It resembles *Psychotria ramosis-*

sima Elm., differing in its puberulent entirely different inflorescences, and *P. piperi* Merr., differing from the latter in its much fewer nerved leaves; it is apparently much more closely allied to *P. piperi* than to *P. ramosissima.* Possibly a *Grumilea* rather than a *Psychotria,* but the fruits are unknown.

PSYCHOTRIA PAUCIFLORA Bartl. ex DC. Prodr. 4 (1830) 522.

LUZON, *Haenke.*

I have examined the type of this species in the Prague herbarium, but from the description, a carbon rubbing to show the form and venation of the leaves, and my critical notes on the type, I am unable to refer to it a single specimen in our abundant material of *Psychotria* and *Grumilea.* I have no notes on the seeds, other than that the pyrenes are prominently 3- or 4-ridged, and hence cannot at this time determine whether it is a *Psychotria* or a *Grumilea.* It is characterized by its sessile infructescence which is about 2 cm in length and with but about 6 fruits. The characters of the fruit are similar to those of *Psychotria manillensis* Bartl., and the leaves resemble a small-leaved form of the same species, but have closer, more numerous nerves, 10 to 12 on each side of the midrib.

SPECIES OF PSYCHOTRIA EXCLUDED OR EXCLUDED FROM THE PHILIPPINE FLORA

PSYCHOTRIA ANDAMANICA Kurz; F.-Vill. Novis. App. (1880) 112.
PSYCHOTRIA ANGULATA Korth.; F.-Vill. l. c.
PSYCHOTRIA DIVERGENS Kurz; F.-Vill. l. c.
PSYCHOTRIA MARIANA Bartl.; F.-Vill. l. c.
PSYCHOTRIA SULCATA Wall.; F.-Vill. l. c.

The above species were admitted to the Philippine Flora by F.-Villar, Novissima Appendix, ed. 3, Blanco Flora de Filipinas, through erroneous identifications; none of the species have been found in the Archipelago.

PSYCHOTRIA PHILIPPENSIS Cham. & Schlecht. in Linnaea 4 (1829) 21; DC. Prodr. 4 (1830) 505; Miq. Fl. Ind. Bat. 2 (1856) 282; F.-Vill. Novis. App. (1880) 112; Elm. Leafl. Philip. Bot. 1 (1906) 22=*Scyphiphora hydrophyllacea* Gaertn.

I have examined the type of *Psychotria philippensis* C. & S., in the Berlin herbarium, and it is Gaertner's species.

GRUMILEA Gaertner

This genus was proposed in the year 1788 for a Ceylon plant, *Grumilea nigra* Gaertn., and regarding the species Trimen[3] states that *Psychotria thwaitesii* Hook. f. (1880) is almost certainly the same as Gaertner's *Grumilea nigra.* The genus is distinguished from *Psychotria* on the basis of its ruminated seeds, and, so far as our abundant Philippine material shows, this character is distinctly constant. On the other hand, however, in both *Psychotria* proper and in *Grumilea,* we have, as to habit, vines, undershrubs, shrubs, and small trees, and as to fruit characters plants presenting entirely smooth fruits, pyrenes, and seeds through slightly to prominently ridged or

[3] Fl. Ceyl. 2 (1894) 358.

sulcate ones; in both we have entirely glabrous to very pubescent species. While many authors have recognized *Grumilea* as a valid genus, most recent botanists have followed Bentham & Hooker f. in placing the species with ruminated seeds under *Psychotria*. K. Schumann,[4] however, has retained Gaertner's genus, and has described many African and Malayan species. He has been followed by S. Moore, Hiern, Krause, and to a less degree by Valeton. Examination of the seed characters of our Philippine forms has shown that the bulk of our species that have previously been referred to *Psychotria* are in reality referable to *Grumilea*, and it is suspected that a high percentage of the Malayan species are *Grumilea* rather than *Psychotria*. While I have examined all of our rather abundant Malayan material, I am at present concerned only with those forms that are found in the Philippines. Below is given a list of those species, described under *Psychotria*, which are definitely referable to *Grumilea*, followed by the descriptions of a few apparently undescribed forms.

GRUMILEA ARBORESCENS (Elm.) comb. nov.

Psychotria arborescens Elm. Leafl. Philip. Bot. 3 (1911) 1080.

MINDANAO, *Elmer 11263*.

This species is apparently very closely allied to *Psychotria celebica* Miq.

GRUMILEA URDANETENSIS (Elm.) comb. nov.

Psychotria urdanetensis Elm. Leafl. Philip. Bot. 5 (1913) 1983.

MINDANAO, *Elmer 13703*.

GRUMILEA RIZALENSIS (Merr.) comb. nov.

Psychotria rizalensis Merr. in Philip. Journ. Sci. 8 (1912) Bot. 57.

LUZON, *Loher 6345, 6405*.

GRUMILEA MICROPHYLLA (Elm.) comb. nov.

Psychotria microphylla Elm. Leafl. Philip. Bot. 2 (1908) 522.

NEGROS, *Elmer 9505, 10191*. PALAWAN, *Bur. Sci. 705 Foxworthy*.

GRUMILEA VERSICOLOR (Elm.) comb. nov.

Psychotria versicolor Elm. Leafl. Philip. Bot. 4 (1912) 1352.

PALAWAN, *Elmer 12763*. MINDANAO, *Elmer 13740* (as *P. luzonensis*). TINAGO, *Ahern 472*.

Valeton cites *Ahern 472*, and *Elmer 8200* (err. *82000*) sub *Psychotria aurantiaca* Bl., with doubt; cfr. Ic. Bogor. 3: 227, but I do not think that *Ahern 472* can be so referred, although Blume's species is a *Grumilea*.

GRUMILEA MINDANAENSIS (Merr.) comb. nov.

Psychotria mindanaensis Merr. in Philip. Journ. Sci. 8 (1913) Bot. 54.

MINDANAO, *Merrill 8084, 8096*.

[4] Engl. & Prantl. Nat. Pflanzenfam. 4[4] (1891) 115.

GRUMILEA NEGROSENSIS (Elm.) comb. nov.

Psychotria negroensis Elm. Leafl. Philip. Bot. 2 (1908) 520.

NEGROS, *Elmer 9686. For. Bur. 5567 Everett.*

GRUMILEA PALOENSIS (Elm.) comb. nov.

Psychotria paloensis Elm. Leafl. Philip. Bot. 1 (1906) 65.

LEYTE, *Elmer 7056.* MINDANAO, *Clemens 492, 559, 867.*

GRUMILEA PHANEROPHLEBIA (Merr.) comb. nov.

Psychotria phanerophlebia Merr. in Philip. Journ. Sci. 5 (1910) Bot. 243.

LUZON, *Bur. Sci. 7404, 14506 Ramos.*

GRUMILEA PILOSELLA (Elm.) comb. nov.

Psychotria pilosella Elm. Leafl. Philip. Bot. 1 (1908) 353.

LUZON, *Elmer 9213, Bur. Sci. 9363 Robinson.*

GRUMILEA PINNATINERVIA (Elm.) comb. nov.

Psychotria pinnatinervia Elm. Leafl. Philip. Bot. 1 (1906) 26.

LUZON, *Whitford 932, Elmer 7894, 7905, Bur. Sci. 2099, 2634, 19555 Ramos, Phil. Pl. 337 Ramos, Loher 6327, 8372, Bur. Sci. 2405, 2406 Foxworthy, For. Bur. 7877 Curran & Merritt, Baker 2457.*

GRUMILEA PLUMIERIAEFOLIA (Elm.) comb. nov.

Psychotria plumeriaefolia Elm. Leafl. Philip. Bot. 3 (1911) 1026.

SIBUYAN, *Elmer 12250.* LUZON, *Bur. Sci. 9295 Robinson.* POLILLO, *Bur. Sci. 9402 Robinson.* NEGROS, *For. Bur. 7256 Everett.*

GRUMILEA RUBIGINOSA (Elm.) comb. nov.

Psychotria rubiginosa Elm. Leafl. Philip. Bot. 1 (1906) 25; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 135.

LUZON, *Elmer 6718, Whitford 243, s. n., For. Bur. 2778 Meyer, Bur. Sci. 13776 Ramos.*

GRUMILEA SUBALPINA (Elm.) comb. nov.

Psychotria subalpina Elm. Leafl. Philip. Bot. 1 (1906) 64.

LUZON, *Elmer 7942, 7672, For. Bur. 7855 Curran & Merritt, Bur. Sci. 19568 Ramos.* MINDORO, *Merrill 6159.*

GRUMILEA SUBSESSILIFLORA (Elm.) comb. nov.

Psychotria subsessiliflora Elm. Leafl. Philip. Bot. 1 (1906) 24.

LUZON, *Whitford 722, Baker 2461, Bur. Sci. 19425 Ramos.* MINDANAO, *Ahern 321.* MINDORO, *For. Bur. 11468 Merritt.*

GRUMILEA LUÇONIENSIS (Cham. & Schlecht.) comb. nov.

Coffea luçoniensis Cham. & Schlecht. in Linnaea 4 (1829) 32; DC. Prodr. 4 (1830) 502; Miq. Fl. Ind. Bat. 2 (1856) 308.

Paederia tacpo Blanco Fl. Filip. (1837) 160, ed. 2 (1845) 113, ed. 3, 1 (1877) 202; Usteri Beitr. Kenn. Philip. Veg. (1905) 119 (*P. jacpo*).

Psychotria luzoniensis F.-Vill. Novis. App. (1880) 112; Vid. Rev. Pl. Vasc. Filip. (1886) 157; Merr. Fl. Manila (1912) 453.

Psychotria tacpo Rolfe in Journ. Linn. Soc. Bot. 21 (1884) 312.
Psychotria malayana F.-Vill. Novis. App. (1880) 112, non Jack.
Psychotria aurantiaca Vid. Cat. Pl. Prov. Manila (1880) 34, non Bl.

This much-named species is by far the commonest and most widely distributed representative of *Grumilea* or *Psychotria* found in the Philippines. It is represented by no less than 80 specimens in the herbarium of the Bureau of Science, ranging from northern Luzon southward to Mindoro, Panay, and Leyte, for the most part distributed as *Psychotria malayana* and *P. tacpo* (earlier collections) and *P. luçoniensis* (recent collections).

GRUMILEA MALAYANA (Jack) comb. nov.

Psychotria malayana Jack in Malay Miscel. 1 (1820) 3, Calc. Journ. Nat. Hist. 4 (1843) 26; King & Gamble in Journ. As. Soc. Beng. 74² (1905) 18.
Psychotria aurantiaca Wall. in Roxb. Fl. Ind. ed. Carey & Wall. 2 (1824) 165; Bl. Bijdr. (1826) 962; Valeton in Ic. Bogor. 3 (1909) 225, *t. 283*.

This species, as I interpret it, has been found in the Philippines only in Palawan. Here I refer *For. Bur. 3540 Curran, Bur. Sci. 21534 Escritor, Merrill 472,* and *Phil. Pl. 1229 Merrill,* as these specimens seem to me to represent the same species as *Koorders 25589* from Java. The range of the species is the Malay Peninsula, Singapore, Borneo, Java, Sumatra, and Banca.

GRUMILEA ACUMINATISSIMA (Elm.) comb. nov.

Psychotria acuminatissima Elm. Leafl. Philip. Bot. 1 (1908) 353.

LUZON, *Elmer 8752, Bur. Sci. 13876 Ramos.*

GRUMILEA BANAHAENSIS (Elm.) comb. nov.

Psychotria banahaensis Elm. Leafl. Philip. Bot. 1 (1906) 26.

LUZON, *Whitford 983, 625, Bur. Sci. 15077 Ramos, Elmer 9124.* POLILLO, *Bur. Sci. 6835, 6842 Robinson, Bur. Sci. 10775 McGregor.*

GRUMILEA ALVAREZII (Merr.) comb. nov.

Psychotria alvarezii Merr. in Philip. Journ. Sci. 8 (1913) Bot. 56.

LUZON, *For. Bur. 22189 Alvarez.*

GRUMILEA BATAANENSIS (Elm.) comb. nov.

Psychotria bataanensis Elm. Leafl. Philip. Bot. 1 (1906) 23; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 134.

LUZON, *Elmer 6980, Whitford 214, Merrill 3180, 3765, For. Bur. 2078 Borden, Williams 411, 613, For. Bur. 1508 Ahern's collector, Bur. Sci. 1599 Foxworthy,* all from Mount Mariveles, Province of Bataan.

GRUMILEA GRACILIPES (Merr.) comb. nov.

Psychotria gracilipes Merr. in Philip. Journ. Sci. 8 (1913) Bot. 52.

LUZON, *Bur. Sci. 14507 Ramos, Weber 1572.*

GRUMILEA LOHERI (Elm.) comb. nov.

Psychotria loheri Elm. Leafl. Philip. Bot. 1 (1906) 356.

LUZON, *Elmer 8584, Bur. Sci. 5475, 7062 Ramos, Williams 1269, 1338,*

For. Bur. 14164 Merritt, all from the Mountain Province (Benguet and Abra).

GRUMILEA LONGIPEDICELLATA (Elm.) comb. nov.

Psychotria longipedicellata Elm. Leafl. Philip. Bot. 1 (1906) 22.

LUZON, *Merrill 3361, Whitford 907.*

GRUMILEA LONGIPEDUNCULATA (Elm.) comb. nov.

Psychotria longipedunculata Elm. Leafl. Philip. Bot. 3 (1911) 1027.

SIBUYAN, *Elmer 12532.* POLILLO, *Bur. Sci. 10218 McGregor.*

GRUMILEA MACGREGORII (Merr.) comb. nov.

Psychotria macgregorii Merr. in Philip. Journ. Sci. 5 (1910) Bot. 389.

LUZON, *Merrill 6495, Bur. Sci. 8854, 19825 McGregor, For. Bur. 16353, 18077, 18082 Curran, Merritt, & Zschokke.*

GRUMILEA CAGAYANENSIS (Merr.) comb. nov.

Psychotria cagayanensis Merr. in Philip. Journ. Sci. 8 (1913) Bot. 51.

LUZON, *Bur. Sci. 13912 Ramos, For. Bur. 15491 Bernardo.*

GRUMILEA CEPHALOPHORA (Merr.) comb. nov.

Psychotria cephalophora Merr. in Philip. Journ. Sci. 3 (1908) 438.

BABUYANES ISLANDS, Camiguin, *Bur. Sci. 4048 Fénix.*

GRUMILEA CRISPIPILA (Merr.) comb. nov.

Psychotria crispipila Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 240.

LUZON, *Bur. Sci. 5464, 5463, 5581 Ramos, For. Bur. 18150, 18121 Curran, Zschokke, & Merritt, Merrill 4490, Elmer 6549, 8794, For. Bur. 4983, 4994 Curran, Bur. Sci. 4285, 4427 Mearns, Williams 1222, 1301, 1539,* all from the Mountain Province (Benguet and Lepanto).

GRUMILEA EUPHLEBIA (Merr.) comb. nov.

Psychotria euphlebia Merr. in Philip. Journ. Sci. 8 (1913) Bot. 55.

LUZON, *Bur. Sci. 14582, 13928 Ramos, For. Bur. 19638 Curran.*

GRUMILEA TAYABENSIS (Elm.) comb. nov.

Psychotria tayabensis Elm. Leafl. Philip. Bot. 1 (1908) 354.

LUZON, *Elmer 7581, 7934, Bur. Sci. 13354, 2121, 12108 Ramos, Bur. Sci. 6070 Robinson, For. Bur. 7870 Curran & Merritt, Gates 6462.* MINDORO, *For. Bur. 6883 Merritt.*

GRUMILEA WEBERI (Merr.) comb. nov.

Psychotria weberi Merr. in Philip. Journ. Sci. 8 (1913) Bot. 54.

LUZON, *Weber 1573, For. Bur. 19579 Curran.*

GRUMILEA ERYTHROTRICHA (Elm.) comb. nov.

Psychotria erythrotricha Elm. Leafl. Philip. Bot. 5 (1913) 1891.

MINDANAO, Province of Agusan, *Elmer 13486.* LEYTE, *Wenzel 775.*

GRUMILEA VELUTINA (Elm.) comb. nov.

Psychotria velutina Elm. Leafl. Philip. Bot. 5 (1913) 1894.

POLILLO, *Bur. Sci. 10212 McGregor.* MINDANAO, *Elmer 13615* (cited in the original description as *13605*). LUZON, *Bur. Sci. 13362, 22098 Ramos.*

GRUMILEA SIMILIS (Elm.) comb. nov.

Psychotria similis Elm. Leafl. Philip. Bot. 3 (1911) 1025.

SIBUYAN, *Elmer 12439*. NEGROS, *For. Bur. 7260 Everett*.

GRUMILEA PYRAMIDATA (Elm.) comb. nov.

Psychotria pyramidata Elm. Leafl. Philip. Bot. 4 (1912) 1350.

PALAWAN, *Elmer 13183, For. Bur. 21496 Fernandez, Bur. Sci. 900 Foxworthy, Merrill 9518*.

GRUMILEA PALAWANENSIS (Elm.) comb. nov.

Psychotria palawanensis Elm. Leafl. Philip. Bot. 4 (1912) 1348.

PALAWAN, *Elmer 12737*.

GRUMILEA AMARACARPOIDES sp. nov.

Frutex erectus 2 ad 3 m altus, partibus junioribus ferrugineo-villosis; foliis oblongis ad oblongo-lanceolatis, in siccitate brunneis, obtusis ad obscure acuminatis, basi acutis, usque ad 5 cm longis, nervis utrinque 7 ad 9; fructibus terminalibus, solitariis, sessilis, ellipsoideis vel ovoideis, laevis, circiter 8 mm longis, pyrenis obscure 3-costatis, albumine ruminato.

An erect shrub 2 to 3 m high, the branchlets, petioles, and midribs on the lower surface of the leaves rather prominently appressed ferruginous-villous. Branches and branchlets slender, terete. Leaves oblong to oblong-lanceolate, chartaceous, brown and slightly shining when dry, 2.5 to 5 cm long, 7 to 15 mm wide, subequally narrowed to the acute base and to the obtuse to obscurely acuminate apex; lateral nerves 7 to 9 on each side of the midrib, slender; petioles 5 mm long or less. Fruits terminal, solitary, sessile, red when mature, about 8 mm long, ovoid to ellipsoid, smooth, not at all ridged when dry, the pyrenes plano-convex, the back obscurely 3-ridged. Albumen ruminate.

LUZON, Province of Abra, *Bur. Sci. 7275 Ramos;* Subprovince of Lepanto, altitude 1,600 m, *For. Bur. 5721 Klemme:* Subprovince of Bontoc, *Vanoverbergh 695*, altitude 1,450 m: Province of Zambales, Mount Tapulao, *For. Bur. 8120 Curran & Merritt, Bur. Sci. 4757 Ramos*, altitude 1,400 to 1,800 m: Province of Bataan, Mount Mariveles, *For. Bur. 2837 Meyer* (type), *Whitford 1193, Merrill 3194, Elmer 6975*, altitude 1,000 to 1,200 meters. MINDORO, *For. Bur. 8638, 8748 Merritt*, altitude 1,200 meters.

This is the species reported from the Philippines as *Amaracarpus pubescens* Blume (Elmer Leafl. Philip. Bot. 1 (1906) 1; Merrill in Philip. Journ. Sci. 1 (1906) Suppl. 136), but it is manifestly no *Amaracarpus* in spite of its superficial resemblance to *A. pubescens* Blume, and its solitary fruits. The seeds are prominently ruminate. It is apparently very closely allied to *Grumilea urdanetensis* (Elm.) Merr.

I have Javan specimens of *Amaracarpus pubescens* Blume for comparison (coll. Koorders), while Blume's species has recently been very carefully described and figured by Valeton Ic. Bogor. 3 (1909) 207, *t. 278*.

GRUMILEA CAMARINENSIS sp. nov.

Frutex circiter 3 m altus, subglaber; foliis chartaceis, oblongis ad late oblongo-oblanceolatis, usque ad 11 cm longis, brevissime acuminatis, deorsum angustatis, basi acutis, subtus ad nervos plus minusve hirsutis, nervis utrinque circiter 10, prominentibus, adscendentibus; fructibus ellipsoideis, circiter 12 mm longis, sessilibus, calycibus persistentibus; pyrenis plano-convexis, circiter 8 mm longis, longitudinaliter 4-sulcatis, albumine ruminato.

A shrub about 3 m high, the young branchlets more or less hirsute. Branches glabrous, terete, dark-gray. Leaves firmly chartaceous, oblong to broadly oblong-oblanceolate, 7 to 11 cm long, 2 to 3.5 cm wide, the apex shortly and obscurely acuminate or merely acute, narrowed from about the middle to the acute base, dark-colored on both surfaces when dry, dull, the lower surface sparingly hirsute on the lateral nerves and midrib; lateral nerves about 10 on each side of the midrib, very prominent on the lower surface, ascending; petioles 1 to 1.5 cm long. Inflorescence terminal, in fruit 5 cm long or less, ferruginous-hirsute, usually once forked, bearing few fruits, all sessile. Fruits yellow, ellipsoid, about 12 mm long, fleshy when fresh, the persistent calyx-tube prominent, crowning the fruit. Pyrenes 2, ellipsoid, 8 mm long, 5 mm wide, plano-convex, longitudinally 4-sulcate, ridged, seeds ruminate.

LUZON, Province of Camarines, Mount Iriga, in the mossy forest, *Phil. Pl. 1552 Ramos* (type), November 29, 1913. LEYTE, *For. Bur. 16906 Rosenbluth.*

A species characterized by its prominently nerved leaves and its few, sessile fruits covered by the persistent calyx-tube.

GRUMILEA FASCICULIFLORA sp. nov.

Frutex 1 ad 2 m altus, glaber; foliis lanceolatis, usque ad 20 cm longis, acuminatis, basi acutis, in siccitate brunneis chartaceis, nervis utrinque 12 ad 16, distantibus, distinctis; fructibus junioribus obovoideis, circiter 5 mm longis, breviter pedicellatis, in fasciculis terminalibus dispositis, pyrenis plano-convexis, dorso haud sulcato, albumine ruminato.

A shrub 1 to 2 m high, quite glabrous, the branches terete, rather slender, brownish in color when dry, smooth. Leaves lanceolate, chartaceous, brown and slightly shining when dry, 10 to 20 m long, 2 to 3 cm wide, subequally narrowed to the acuminate apex and to the acute base; lateral nerves 12 to 16 on each side of the midrib, slender, distinct, distant, curved, scarcely anastomosing, the reticulations lax; petioles 5 to 8 mm long; stipules 1 to 2 mm long, truncate. Young fruits

fascicled at the tips of the branchlets, about 8 in a fascicle, their pedicels about 4 mm long. Fruits somewhat obovoid, brown when dry, smooth, not at all sulcate, about 5 mm long, the pyrenes plano-convex, smooth, not at all sulcate or ridged, seeds ruminate.

SAMAR, Yabong, *Bur. Sci. 17519 Ramos*, March 15, 1914, on forested slopes.

The alliance of this species is with *Psychotria euphlebia* Merr., but with quite differently shaped, fewer nerved leaves. In facies it resembles *Psychotria mindanaensis* Merr., but the inflorescence is entirely different from that species. It is well characterized by its elongated, lanceolate leaves and its flowers and fruits borne in terminal fascicles.

GRUMILEA ISAROGENSIS sp. nov.

Frutex glaber; foliis oblongo-ellipticis ad lanceolato-ellipticis, chartaceis, usque ad 9 cm longis, utrinque subaequaliter angustatis, apice acuminatis, basi cuneatis, nervis utrinque circiter 8, distantibus, tenuibus; inflorescentiis 2 ad 3 cm longis, pauciforis, laxis; fructibus obovoideis, non sulcatis, 7 mm longis, albumine ruminato.

A glabrous shrub 2 to 3 m high, the branches and branchlets slender, grayish or brownish, wrinkled when dry. Leaves firmly chartaceous, oblong-elliptic to lanceolate-elliptic, 7 to 9 cm long, 1.6 to 2.2 cm wide, subequally narrowed to the somewhat acuminate apex and to the cuneate base, dull-olivaceous when dry, of nearly the same color on both surfaces; lateral nerves about 8 on each side of the midrib, distant, slender, obscurely anastomosing, the reticulations lax, obscure; petioles 1 to 1.5 cm long; stipules lanceolate, caducous, 8 mm long. Inflorescence a terminal, lax, few-flowered, 2 to 3 cm long panicle. Fruits few, 3 to 6 on each inflorescence, their peduncles 7 to 9 mm long, the fruits obovoid, smooth, not sulcate, 7 mm long, 5 mm in diameter, the apex rounded, calyx-tube not persistent, base acute; pyrenes plano-convex, quite smooth, not at all sulcate or ridged, seeds ruminate.

LUZON, Province of Camarines, Mount Isarog, in the mossy forest, *Phil. Pl. 1553 Ramos*, November 29, 1913.

A species manifestly allied to *Grumilea acuminatissima* (Elm.) Merr. and to *G. loheri* (Elm.) Merr., but apparently sufficiently distinct from both.

GRUMILEA LANAENSIS sp. nov.

Frutex scandens inflorescentiis exceptis glaber; foliis chartaceis vel subcoriaceis, ellipticis ad oblongo-ellipticis, usque ad 5 cm longis, utrinque subaequaliter angustatis, basi acutis, apice breviter acuminatis, nervis utrinque 6 vel 7, obscuris, reticulis

subobsoletis; inflorescentiis terminalibus, pedunculatis, griseo-puberulis, trifidis, 5 ad 6 cm diametro; fructibus carnosis, circiter 5 mm longis, ovoideis, laevis, pyrenis plano-convexis, haud sulcatis, albumine valde ruminato.

A scandent shrub, glabrous except the inflorescence. Branches terete, grayish or brown, sometimes with numerous roots on the internodes. Leaves elliptic to oblong-elliptic, chartaceous or subcoriaceous, dark-brown or dark olivaceous-brown when dry, brittle, slightly shining, 4 to 5 cm long, 1.5 to 2.5 cm wide, subequally narrowed to the acute base and to the shortly acuminate apex; lateral nerves 6 or 7 on each side of the midrib, not prominent, slender, anastomosing close to the margin, the primary reticulations very few, lax, obscure, the secondary ones entirely obsolete; petioles 3 to 5 mm long; stipules suborbicular, rounded, about 3 mm in diameter, caducous. Inflorescences terminal, peduncled, usually about 6 cm long and 5 to 6 cm in diameter, the peduncles about 3 cm in length, each bearing three subequal branches, the flowers crowded on the ultimate branchlets of the trifid inflorescence, the young branchlets, pedicels, and flowers densely puberulent with brownish or grayish hairs. Flowers numerous, white, fragrant, the pedicels very short. Calyx about 1.5 mm long, obscurely 5-toothed. Corolla-tube 2 mm long, puberulent outside, villous within, the lobes 5, oblong, obtuse, about 1.8 mm long. Anthers oblong, 1 mm long. Fruit fleshy and white when mature, ovoid, about 5 mm long, the pericarp apparently very soft; pyrenes plano-convex, smooth, not at all ridged, elliptic to somewhat obovoid, rounded, 4 mm long, the seeds prominently ruminate.

MINDANAO, District of Lanao, Camp Keithley, *Mrs. Clemens 924* (type), *s. n.*, in September–October, and in June, 1907, in swamps, altitude about 750 meters.

This species, in general appearance, rather closely approximates some forms of *Psychotria ixoroides* Bartl., but its fruits are entirely different, and its prominently ruminate albumen places it in the genus *Grumilea*. It is doubtless closely allied to *Grumilea sarmentosa* (Blume) K. Sch., but is not at all *Psychotria sarmentosa* as described by Hooker f. in his Flora of British India.

GRUMILEA NITENS sp. nov.

Frutex circiter 2 m altus, glaber; foliis coriaceis vel subcoriaceis, oblongis, usque ad 19 cm longis, acutis vel obscure acuminatis, basi acutis, in siccitate nitidis, brunneis vel supra olivaceo-brunneis, margine leviter recurvatis, nervis utrinque 16 ad 18, distinctis; inflorescentiis terminalibus, usque ad 9 cm

longis e basi ramosis; fructibus paucis, obovoideis, brunneis, laevis, haud sulcatis, circiter 8 mm longis, pyrenis plano-convexis, laevis, albumine valde ruminato.

A shrub about 2 m high, quite glabrous. Branches terete, somewhat grayish, wrinkled when dry, the younger ones yellowish-brown. Leaves oblong, mostly 14 to 19 cm long, 4.5 to 6.5 cm wide, subequally narrowed to the acute base and to the acute or slightly acuminate apex, brownish or the upper surface brownish-olivaceous when dry, smooth, shining, the margins slightly recurved; lateral nerves 16 to 18 on each side of the midrib, slender, curved, distinctly anastomosing, the primary reticulations lax; petioles 2 to 2.5 cm long; stipules caducous, the scars prominent. Inflorescence terminal, up to 9 cm long, with one or two branches from the very base, these spreading and 5 cm long or less, otherwise unbranched below the upper one-fourth, the branches here short, each with two or three fruits. Fruits obovoid, brown when dry, smooth, not at all ridged or sulcate, about 8 mm long, the pyrenes plano-convex, smooth, seeds prominently ruminate.

LUZON, Province of Isabela, Palanan Bay, *Bur. Sci. 21157 Escritor*, June 25, 1913.

This species is well characterized by its brownish leaves which are rather prominently shining when dry, subequally narrowed at both ends, the margins slightly recurved. The obovoid smooth fruits somewhat resemble those of *Grumilea luçoniensis* Merr., which is perhaps the closest alliance of the present species among the numerous Philippine forms.

GRUMILEA PAPILLATA sp. nov.

Frutex erectus, ramulis foliisque prominente ferrugineo-hirsutus; foliis oblongis ad oblongo-ellipticis, chartaceis, usque ad 11 cm longis, utrinque plus minusve papillatis, acuminatis, basi acutis, nervis utrinque circiter 12, subtus prominentibus; fructibus terminalibus, fasciculatis, dense confertis, ovoideis, circiter 8 mm longis, leviter hirsutis, laevis; pyrenis plano-convexis, laevis, albumine ruminato.

An erect shrub, 1 m high *fide* Ramos, the branchlets and leaves prominently hirsute with spreading ferruginous hairs. Branches terete, grayish to brownish, glabrous, the branchlets very densely ferruginous-hirsute. Leaves oblong to oblong-elliptic, chartaceous, brown when dry, 8 to 11 cm long, 2.5 to 3.5 cm wide, base acute to subobtuse, apex distinctly acuminate, both surfaces with scattered papillae, the papillae extended as ferruginous hairs, the midrib and lateral nerves on the lower surface prominently hirsute; lateral nerves about 12 on each side of the midrib, very prominent, curved, obscurely anasto-

mosing, the reticulations lax, obscure; petioles densely ferruginous-hirsute, 1 cm long or less. Inflorescence terminal, the flowers fascicled, crowded, subsessile or shortly petioled. Fruits ovoid, about 8 mm long, crowded, black when dry, sparingly hirsute, not at all sulcate or ridged. Pyrenes plano-convex, smooth, about 5 mm long, obovoid, rounded at the apex, base acute, the seed ruminate.

SAMAR, Cauayan Valley, *Phil. Pl. 1701 Ramos*, April, 1914, in forests, along small streams.

This very characteristic species is readily recognizable by its ferruginous indumentum, its papillate leaves, and its densely crowded, apparently fascicled, sessile or subsessile flowers and fruits.

GRUMILEA RADICANS sp. nov.

Frutex scandens, circiter 3 m altus, inflorescentiis puberulis, ramis teretibus, saepe radicantibus; foliis oblongo-lanceolatis, chartaceis vel subcoriaceis, usque ad 11 cm longis, in siccitate griseis, nitidis, apice tenuiter acuminatis, basi acutis, longe petiolatis, nervis utrinque circiter 8; paniculis terminalibus, pedunculatis, ut videtur paucifloris, sub fructu circiter 4.5 cm diametro; fructibus ellipsoideis, 5 mm longis, laevis, seminibus plano-convexis, laevis, nec sulcatis nec carinatis, albumine ruminato.

A scandent glabrous shrub reaching a height of 3 m, the stem 5 mm in diameter, often rooting to its support, terete, the branchlets terete, cinereous, 2 to 3 mm in diameter. Leaves oblong to oblong-lanceolate, chartaceous to subcoriaceous, grayish and shining when dry, the lower surface densely and minutely puncticulate, 7 to 11 cm long, 1.5 to 3.5 cm wide, narrowed upward to the slenderly acuminate apex, the base acute; lateral nerves about 8 on each side of the midrib, distant, curved, slender, distinct, the primary reticulations lax; petioles 1 to 2.5 cm long. Panicles terminal, peduncled, in fruit about 4.5 cm in diameter, the peduncles about 3 cm long, the primary branches three. Fruits ellipsoid, green, smooth, about 5 mm long, black when dry, crowned by the short, cylindric, truncate tube which is about 2 mm in diameter and about one-half as long. Seeds two, plano-convex, smooth, not at all sulcate or keeled, prominently ruminate.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1193* (type), in forests, altitude about 500 m, October 1, 1914. Here I also refer *Wenzel 754*, from Leyte, and *Bur. Sci. 18730, 18752 McGregor*, from Biliran.

This species is allied to *Grumilea sarmentosa* K. Sch., from which it differs in its differently shaped inflorescence, and its quite differently shaped leaves. The same characters serve to distinguish this species from *Grumilea sibuyanensis*.

GRUMILEA WENZELII sp. nov.

Frutex glaber, circiter 2 m altus, erectus; foliis subcoriaceis, oblongo-ellipticis ad anguste oblongo-obovatis, usque ad 10 cm longis, apice acuminatis, basi acutis, in siccitate pallidis, nervis utrinque 8 ad 10, distinctis; paniculis terminalibus, brevibus, paucifloris, circiter 2 cm longis, e basi ramosis; fructibus obovoideis, 8 mm longis, in siccitate rugosis, haud sulcatis, pyrenis plano-convexis, laevis, vel extus obscurissime carinatis, albumine prominente ruminato.

A glabrous erect shrub about 2 m high, the branches terete, pale when dry, often somewhat wrinkled. Leaves subcoriaceous, pale when dry, oblong-elliptic to narrowly oblong-obovate, 7 to 10 cm long, 2 to 3.5 cm wide, somewhat shining, apex distinctly acuminate or sometimes merely acute, base acute, the lower surface usually a little paler than the upper; lateral nerves 8 to 10 on each side of the midrib, distinct, the reticulations rather lax; petioles 5 to 12 mm long; stipules deciduous. Panicles terminal, few-flowered, in anthesis about 2 cm long, in fruit up to 3.5 cm long, branched from the base. Flowers white. Calyx about 2 mm in diameter, irregularly 4- to 6-toothed, the teeth somewhat triangular, acute, 0.4 mm long. Corolla-tube 2 mm long, villous at the throat inside, the lobes 4, oblong-ovate, 2.5 mm long, acute or obtuse. Fruits scarlet when fresh, the pericarp somewhat fleshy, when dry about 8 mm long, ovoid, distinctly wrinkled, dark-colored, not at all sulcate. Seeds two, plano-convex, the back smooth, not at all sulcate, sometimes very obscurely keeled, prominently ruminate.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 622, 882, 1142* (type), in forests, altitude about 500 m, flowering in March, with fully matured fruits in September.

A species somewhat similar to *Grumilea luçoniensis* Merr., to which the first two numbers, cited above, were referred. It differs notably in its pale, fewer-nerved leaves, and its larger, distinctly wrinkled fruits, as well as in its seed characters.

CHASALIA Commerson

CHASALIA LURIDA (Blume) Miq. Fl. Ind. Bat. 2 (1857) 282.

Psychotria lurida Blume Bijdr. (1826) 959.
Zwaardekronia lurida Korth. in Nederl. Kruidk. Arch. 2² (1851) 252.
Chasalia curviflora Thwaites Enum. Pl. Zeyl. (1859–64) 150.

MINDORO, *McGregor 307, Bur. Sci. 6834 Merritt.* BANTON, *McGregor, 348.* SIBUYAN, *Elmer 12199, McGregor 26.* TICAO, *For. Bur. 1032 Clark.* LEYTE, *Elmer 7057.* PALAWAN, *Merrill 864.* BALABAC, *Merrill 5379.* BALUT, *Merrill 5416.* MINDANAO, District of Cotabato, *For. Bur. 14229 Whitford.*

The oldest valid specific name is here adopted for this widely distributed plant. The Philippine specimens here referred to *Chasalia lurida*

Miq. present considerable variation in the size of the leaves, but the venation and characters of the inflorescence, the flowers, and the fruits are essentially identical with material from Ceylon (*Thwaites C. P. 1714*), the Malay Peninsula, Singapore, and Borneo. The leaves of the Philippine specimens average somewhat wider than in our extra-Philippine material.

Chasalia obscurinervia Elm. Leafl. Philip. Bot. 3 (1911) 1033, based on *Elmer 11200* from Mindanao, a specimen with immature fruits, is probably identical with *Chasalia lurida* Miq. Comparing *Elmer 11200* with *Thwaites C. P. 1714* I can detect no constant differential characters that would lead me to consider the two specimens specifically distinct; they are not, however, directly comparable as Elmer's specimen has immature fruits, while Thwaites's specimen is in flower. *Chasalia expansa* Miq., to which Mr. Elmer compares his species, is, according to Koorders, a synonym of *Psychotria montana* Blume.

STREBLOSA Korthals

STREBLOSA AXILLIFLORA sp. nov.

Frutex vel suffrutex parvus, inflorescentiis axillaribus minute hirsutus; foliis membranaceis, oblongis ad oblongo-ellipticis, olivaceis, usque ad 15 cm longis, longe petiolatis, utrinque aequaliter angustatis acutisque, nervis lateralibus utrinque circiter 15; inflorescentiis numerosis, axillaribus, quam petiolo brevioribus, subcymosis, brevissime pedunculatis; floribus minutis, haud 2 mm longis, bracteolatis; fructibus ellipsoideis, 2 mm longis, longitudinaliter sulcatis; pyrenes plano-convexis, dorso acute 3-carinato, albumine aequabile.

A shrub or undershrub (size not indicated by the collector), nearly glabrous except the inflorescence which is pubescent with scattered, short hairs. Branches terete. Leaves membranaceous, olivaceous when dry, slightly shining, oblong to oblong-elliptic, 9 to 15 cm long, 3.5 to 5.5 cm wide, subequally narrowed to the acute base and apex, the lower surface very obscurely puberulent at least on the nerves; lateral nerves about 15 on each side of the midrib, distinct, somewhat curved, anastomosing; petioles 3 to 4 cm long; stipules up to 8 mm long, cleft nearly to the base into two, lanceolate, acuminate segments. Inflorescence subcymose, axillary, short-peduncled, 2 cm long or less, sparingly hirsute with short hairs, the branches few, the flowers and fruits rather densely crowded; bracts oblong-ovate, up to 1.8 mm long, slightly pubescent. Flowers 2 mm long or less, the calyx slightly pubescent, 5-toothed. Stamens 5; anthers 0.5 mm long. Fruit ellipsoid, about 2 mm long, slightly hirsute, longitudinally ridged, the pyrenes plano-convex, the back distinctly and rather sharply 3-ridged, seeds not at all ruminate.

LUZON, Province of Camarines, Mount Isarog, *Bur. Sci. 22018 Ramos* (type), November, 1913. SAMAR, Cauayan Valley, *Bur. Sci. 17514 Ramos*,

March, 1914, along small streams in forests, the Bicol name recorded as *tungirit*.

This species is similar to, and manifestly closely allied to *Streblosa tortilis* Korthals (*Psychotria tortilis* Blume) of the Malay Peninsula and Archipelago, but is at once distinguished by its leaves not being at all lepidote and with more numerous lateral nerves.

I am in agreement with Valeton and with Ridley in considering *Streblosa* Korthals to be a valid genus. In aspect the plants are entirely different from *Psychotria* and *Grumilea*, and the differential characters appear to be constant. From all our representatives of *Psychotria* and *Grumilea* the present species is distinguished by its minute fruits and axillary inflorescences; surely, if *Grumilea* is to be separated from *Psychotria*, there are as great or geater reasons for distinguishing *Streblosa* as a valid genus.

HYDNOPHYTUM Jack

HYDNOPHYTUM BRACHYCLADUM sp. nov.

Frutex epiphyticus, glaber; ramis primariis numerosis, circiter 20 cm longis, 2 ad 3 mm diametro, in siccitate plus minusve rugosis vel sublaevis, pallide brunneis; foliis ut videtur carnosis, in siccitate chartaceis, oblongis ad ovatis vel suborbicularis, usque ad 6 cm longis, nervis utrinque 3 vel 4, obscuris vel obsoletis; floribus axillaribus, fasciculatis, circiter 7 mm longis.

An epiphytic shrub, quite glabrous, the base swollen, subglobose, apparently about 15 cm in diameter, brown and wrinkled when dry. Branches numerous, fascicled, about 20 cm long, terete or subterete, 2 to 3 mm in diameter, pale-brownish when dry, usually wrinkled, when fresh apparently somewhat fleshy. Leaves apparently fleshy and coriaceous when fresh, when dry chartaceous, rather pale or the younger ones nearly black, oblong to ovate or even suborbicular, 2 to 6 cm long, 1 to 3 cm wide, usually more or less narrowed to the acute base, rounded in orbicular ones, the apex obtuse, both surfaces rather densely wrinkled when dry; lateral nerves 3 or 4 on each side of the midrib, very slender, obscure, sometimes entirely obsolete; petioles 2 mm long or less; stipules triangular-ovate, acute, 2.5 mm long. Flowers axillary, fascicled, many in each fascicle. Calyx cup-shaped, about 1.5 mm long and wide, sessile, truncate. Corolla slender, 7 mm long, the tube cylindric, slender, 3 mm long, the lobes somewhat spreading, oblong, obtuse or acute, 4 mm long, 1 to 1.2 mm wide, the throat villous. Anthers 1.2 mm long. Style 3 mm long, the arms narrowly club-shaped, 1.5 mm long.

MINDORO, Calapan, *Bur. Sci. 924 Mangubat*, June, 1906.

Apparently well characterized by its numerous, fascicled, comparatively short primary branches which are about 20 cm long, its leaves very diverse in form, and its slender, comparatively long flowers.

HYDNOPHYTUM MINDORENSE sp. nov.

Frutex epiphyticus, glaber, circiter 1.5 m altus, ramis ramulisque teretibus; foliis coriaceis, ellipticis ad ovato-ellipticis, usque ad 8 cm longis, apice late rotundatis, basi acutis, in siccitate nitidis, purpureo-brunneis, nervis utrinque 4 vel 5; floribus, axillaribus, fasciculatis, 5.5 mm longis.

An epiphytic shrub about 1.5 m high, the swollen base about 40 cm in diameter. Branches stout, terete, grayish, and even the branchlets woody, the latter about 3 cm in diameter, often somewhat compressed, their internodes 2.5 to 6 cm long. Leaves elliptic to ovate-elliptic, coriaceous, shining, 5 to 8 cm long, 3 to 4.5 cm wide, the apex broadly rounded, the base acute, when dry somewhat purplish-brown, the lower surface paler than upper and more tinged with purple; lateral nerves 4 or 5 on each side of the midrib, slender, rather distinct, anastomosing, the reticulations obsolete; petioles very stout, 2.5 to 4 mm long. Flowers white, axillary, fascicled, sessile, about 5.5 mm long. Calyx cup-shaped, truncate, about 1.5 mm long and wide. Corolla-tube 3 mm long, slender, the lobes 4, oblong, obtuse, 2.5 mm long, the throat villous. Anthers 1 mm long. Style 3.5 mm long, the arms spreading, 0.5 mm long. Fruit ovoid, red, fleshy, about 7 mm long.

MINDORO, Alag River, *Merrill 6182*, November, 1906, on trees along the river at an altitude of about 100 meters, previously referred to *Hydnophytum formicarium* Jack.

Apparently very closely allied to *Hydnophytum formicarium* Jack, but with elongated branches, somewhat smaller flowers, and somewhat differently shaped leaves which are distinctly tinged with purple in drying.

HYDNOPHYTUM MEMBRANACEUM sp. nov.

Frutex epiphyticus, glaber, circiter 1 m altus; foliis membranaceis, in siccitate nitidis, olivaceis vel subpurpureo-olivaceis, oblongo-obovatis ad late elliptico-ovatis, usque ad 9 cm longis, obtusis vel rotundatis, basi angustatis, acutis, nervis utrinque 5 ad 7, tenuibus; floribus axillaribus, paucis, circiter 2 mm longis.

An epiphytic glabrous shrub about 1 m high, the base about 15 cm in diameter. Branches apparently terete, smooth, more or less compressed when dry, shining, pale grayish-brown, when fresh apparently somewhat fleshy, the ultimate branchlets slender, about 2 mm thick, their internodes up to 3.5 cm long. Leaves membranaceous, when dry puncticulate but not wrinkled, shining, olivaceous, often tinged with purple, oblong-obovate to broadly elliptic-ovate, 5 to 9 cm long, 2 to 6 cm wide, the apex broadly rounded or obtuse, narrowed below to the acute base;

lateral nerves slender, distinct, 5 to 7 on each side of the midrib, the reticulations very lax, indistinct or sometimes obsolete; petioles 5 to 7 mm long. Flowers few, axillary, fascicled, sessile, 2 to 2.5 mm long. Calyx cup-shaped, 1 mm long, 1.5 mm wide, truncate. Corolla 2 mm long, split one-half to two-thirds to the base into 4, narrowly ovate, obtuse lobes, the throat villous inside. Anthers 0.8 mm long. Fruit coral-red, fleshy, ovoid, about 6 mm long, the pyrenes oblong, 4 mm long.

MINDORO, Camantigue, *For. Bur. 3720 Merritt*, March 22, 1906, on trees in mangrove swamps.

A species well characterized by its very thin, oblong-obovate to broadly elliptic-ovate, slenderly nerved leaves, and its very short flowers.

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NOTES ON BORNEAN FERNS

By E. B. COPELAND

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ONE PLATE

A native collector has been employed by the Philippine Bureau of Science, through the agency of the Sarawak Museum, during the past two years. Among many other Bornean plants received from this source are the ferns which are the subject of most of the following notes. Numbers which are cited without the name of the collector refer to the Sarawak material secured by this native collector.

ANGIOPTERIS BROOKSII Copel. (Plate I.)

Professor Campbell of Stanford University, while visiting Sarawak in 1913, collected on Mount Matang simply pinnate and very sparsely bipinnate fronds, all in full fruit, which can be identified positively as *Angiopteris Brooksii* Copel. This seems to be by far the commonest *Angiopteris* of western Sarawak. Photographs of these ferns are shown in the accompanying Plate I. As the plate shows, the frond, when simply pinnate, has an articulation at the upper end of the stipe. It would therefore be technically more correct to regard this as a bipinnate frond with one pinna. The less divided the fronds are, and the smaller the frond as a whole, the larger are the individual pinnules. The first impression made by these specimens is that they may serve to connect the ordinary *Angiopteris*, with large fronds and small pinnules, with *Macroglossum*. However, I doubt that they are of much value in this respect. The sori seem to be typically those of *Angiopteris Brooksii*. The fronds of young plants of various species of *Angiopteris* are likely to be very divergent from the usual *Angiopteris* type. The first fronds formed are always simple. *Angiopteris angustifolia*, the common species of central Luzon, sometimes has fronds up to half a meter or more in length, which suggest those of *Marattia* more than they do those which the same plants produce when more mature. An *Angiopteris* growing in Hongkong is also notable for the variety of fronds produced by plants of about the same size.

HYMENOPHYLLUM SABINIFOLIUM Hooker.

No. 931, without locality.

This occurs also in the Philippines, as well as in Java and Sumatra.

HYMENOPHYLLUM SEMIFISSUM Copel. sp. nov.

Rhizomate gracillimo, late repente, minute et sparse piloso; stipitibus remotis, 1-3 cm altis, filiformibus, haud alatis, rachique sub lente minute et sparse pilosis sub oculo nudo glabris;

fronde 6-8 cm alta, ovata, bi-tri-pinnatifida, rhachi sursum anguste alata, lamina fusca, glabra, venis tamen glabris atris: pinnis oblongis majoribus bipinnatifidis cum laciniis paucis; laciniis usque ad 6 mm longis, ca. 0.8 mm latis, integris, apice plerumque obtusis rarius emarginatis; soro aut laciniam primam acroscopicam aut ramum distalem eadem terminante, involucro medio immerso medio fisso, labiis 1 mm longis, 0.7 mm latis, subacutis, integris, receptaculo nigro longo.

Mount Merinjak, *No. 2607* (type); Mount Trekan, alt 600 m, *Charles Hose 733*, July, 1905. The plants of the Hose collection are slightly the larger.

Apparently a quite distinct species, recognizable by its limited branching, minute hairiness on the main axes, and narrow indusium divided not more than half-way down. By definition it would as well be a *Trichomanes*, but the color, the texture, and the hairs all show its real relationship.

TRICHOMANES MICROLIRION Copel. sp. nov.

Rhizomate filiforme late repente, pilis nigris brevibus dense vestito; stipitibus gracilibus, supra pedes glabris, 5-15 mm altis, teretibus, haud alatis; fronde ovata, 4-6 m alta, rhachi exalata; pinnis infimis stipitatis stipitibus brevibus exalatis, medialibus maximis, oblongis, obtusis, ad alam angustam costae usque ad rachin decurrentem pinnatisectis, segmentis iterumque in segmenta ultima 2-5 lineari-oblonga vel linearia 0.6 mm lata pinnatisectis, margine recta vel subcrispa, vena spuria submarginale interrupta; soris apicalibus, aut sparsis, aut paniculatis et alis pinnarum carentibus, anguste obconicis, bilateraliter marginatis, limbo lato et praestante, patente vel revoluto, integro, receptaculo incluso.

Tringos, *Brooks 172* (type), 1908; ibidem, *Brooks 19*, 1909; Mount Bongo *Brooks & Hewitt.*

Distinguished by the large, entire limb of the involucre and the naked rachis. The involucres of fully fruiting specimens form an inflorescence in which no green lamina is present.

DRYOPTERIS HOSEI (Baker) C. Chr.

No. 2577, Retuh. I have this also from Bidi, along the river, collected by *Brooks.*

There are exceedingly small but very persistent indusia which are dark-brown and slightly hairy. This fern illustrates anew the futility (and worse) of maintaining such "genera" as *Meniscium* and *Phegopteris*, to both of which it has been assigned.

TECTARIA LOBBII (Hooker) Copel.

Aspidium Lobbii Hooker. Sp. Fil. 4 (1862) 59, *t. 232.*

No. 2539, Retuh. I have it also from Bidi and it is reported from several localities. Contrary to Hooker's diagnosis, free veins are present; and, indeed, his plate shows some of them.

ATHYRIUM CYATHEIFOLIUM (Rich.) Milde.

No. 2332, Mount Santubong.

Not previously reported from Borneo; identical with the Philippine plant which I recognize under this name (Cf. Philip. Journ. Sci. 3 (1908) Bot. 293).

The group is represented in Sarawak by *Athyrium Hewittii, A. sarawakense* and *A. muricatum*, and the nearly related *A. polycarpum*. D. Don in Prod. Fl. Nepal. 8, describes *Asplenium latifolium* and *A. maximum* as distinct species, giving short diagnoses, in which the most salient distinguishing character is that the former has alternate and the latter opposite pinnae. Although the two names are commonly treated as synonyms, I have little doubt that they are distinct, and suspect that *A. maximum* is a relative of *A. cyatheifolium*. *Asplenium latifolium* is represented unmistakably in my herbarium, but I have nothing from near Nepaul which I can call *A. maximum*. Clarke (Trans. Linn. Soc. Bot. 1 (1880) 503) says "What *A. maximum*, Don, Prodr. Fl. Nep. 8, may have been can only be guessed; but from Don's description of the sori I should guess it to have been *A. polypodioides*." But this it surely cannot be.

ATHYRIUM PARIPINNATUM Copel. sp. nov.

Species gregis A. cyatheifolii, stipite 45 cm alto, muricato; fronde 1 m alta; pinnis oppositis, infimis 25 cm longis, cum petiolis 3 cm longis, pinnatis, pinnulis subsessilibus medialibus 6 cm longis ad baseos subhastatas 15 mm latis inciso-serratis, acuminatis, infimis minoribus; pinnis medialibus majoribus et brevius stipitatis; pinnarum supramedialium pinnulis adnatis vel confluentibus, ellipticis, 2-3 cm longis, apice rotundatis, serrulatis; pinnis superioribus profunde pinnatifidis; pinnis liberis supremis 15 mm longis, 4 mm latis, vix serrulatis; apice pinnatifida frondis breve et parva; rhachibus castaneis, glabris; lamina subcoriacea gabra, inferne pallida; soris angustis, costam attingentibus, margine hic approximatis illuc et saepius remotis, indusio plerumque simplice.

No. 2658, Mount Merinjak.

The most conspicuous difference between this and the more ample forms of *Athyrium cyatheifolium* is the spiny stipe. My specimen of *A. muricatum* is very distinct in appearance, but I suspect that it may sometimes be compound enough to be very like *A. paripinnatum*. The apex, however, should still be distinctive. *A. muricatum* has a big and coarse pinatifid apex, the highest free (but adnate) pinnae being 4.5 cm long and 12 mm wide. *Athyrium Hewittii* has an apex like *A. paripinnatum*, but its diminutive pinnules give the whole frond a very different appearance.

This species can be transferred to *Diplazium* with perfect ease and certaintly, provided the transfer is not complicated by an attempt to find tenable distinctions between the genera.

LEUCOSTEGIA IMMERSA Presl.

A sterile specimen from Mellinau, upper Baram, collected in November, 1910, by the Sarawak Museum, is almost certainly this species. Not previously reported from Borneo.

SCHIZOLOMA FULIGINEUM Copel.

Nos. 2677, 2678, Kuching, and *2360,* Mount Santubong.

The apparently common occurence of this fern in Sarawak raises a strong suspicion that it is *S. induratum* (Baker) C. Chr., but it remains difficult to reconcile it with several details of Baker's description. It is known from Sibuyan, and Surigao (Mindanao), in the Philippines.

MICROLEPIA HANCEI Prantl.

This has been sent in twice by the native collector, who has not sent *M. Speluncae* at all. One of these collections (*No. 2442*) is from Sikomah, and the other (*No. 76*) without locality. *No. 76* is in no wise distinguishable from the Hongkong plant, and *No. 2442* is surely the same species. From the apparent commonness of this fern in Sarawak, it may be surmised that it has been regarded as *M. Speluncae.*

PLAGIOGYRIA MINUTA Copel. sp. nov.

Rhizomate erecto, breve, radicibus et basibus frondium densissime vestito; fronde sterile ca. 6 cm, alta, 10–12 mm lata, stipite usque ad 1 cm alto et deorsum rachi quadrangulatis minute paleaceis; pinnis multis, alternantibus, sessilibus, 6 mm longis, 1.5–2 mm latis, obtusis, crenatis, coriaceis, glabris; venis simplicibus, utroque latere costae 3 vel 4; frondis fertilis stipite 3 cm alto, pinnis paucis, stipitatis, 2–3 mm longis, 1.5–2 mm latis, cordatis, margine retroflexa lata; annulo continuo, cellulis ca. 26.

Sarawak, locality unknown, native collector *No. 393.*

An evident and near relative of *Plagiogyria egenolfioides* (Baker) Copel. in Journ. Straits Branch Roy. As. Soc. 63 (1912) 72, but much smaller throughout, and the sterile pinnae usually narrowed at the base instead of cordate or auricled.

POLYPODIUM BURBIDGEI Baker.

The largest fronds have the typical arrangement of sori, but some distinctly more slender fronds have the segments bearing all the sori there is room for, and looking quite like those of *Polypodium celebicum.* These narrower and more copiously fertile fronds are the older on the rhizome, suggesting that they are the more primitive, which, indeed, would be anticipated from their much greater resemblance to other species; but as the rhizome which bears these fronds is larger and apparently older than others which bear only fronds with sori along the costa, the suggested evidence from ontogeny is not very strong; and a decrease in the production of fruit is not a usual mark of maturity.

POLYPODIUM PEDICULATUM Baker.

Based on or combined with *Polypodium Lobbianum* Hooker, Sp. Fil. 4 (1862) 226, *t. 278 B.* This figure is not at all a good one; it represents the pinnae as much too wide, and changes very essentially the appearance of the fern. The collection made by the native collector for the Bureau of Science, *No. 2129,* from Mount Bayat, fits Hooker's description perfectly, but looks very unlike the plate. The pinnae are exceedingly narrow, and

lobed very nearly to the costa. The fern is a fine connecting form between *P. decorum* and *P. tenuisectum*, which should certainly be recognized as near relatives.

The fern which I described from Mindanao as *P. inarticulatum*, in Philip. Journ. Sci. 1 (1906) Suppl. 160, and which we have been regarding as *P. pediculatum*, is really most distinct, and is not even a member of the same group; and so far as I yet know it bears no name save that which I gave it.

POLYPODIUM MOULTONI Copel. sp. nov.

Eupolypodium P. decoro Brack. affinis; paleis fuscis; frondibus 12–15 cm altis, 10–12 mm latis; pinnis fere horizontalibus, rectis, vix plusquam 1 mm latis, vix apud rhachin dilatatis, obtusis, coriaceis, integris vel obscure crenulatis; soris fere costularibus, elongatis, immersis, crateribus non setigeris.

No. 2572. Retuh, Sarawak.

The most evenly pectinate *Polypodium* known to me in this part of the world. A near relative of *P. decorum*, as indicated by form of paleae, texture, color of rachis, and the pubescence elsewhere than around the cavities bearing the sori. It differs in having darker paleae, fronds very much more slender throughout, and in the longer sori which are closer to the costa and sunk in naked cavities. While the pinnae stand well apart, they are much more numerous than on equally tall fronds of *P. decorum*.

POLYPODIUM TAENIOPHYLLUM Copel. in Philip. Journ. Sci. 7 (1912) Bot. 65.

No. 1561 collected in 1914, locality not stated, has some of the fronds unusually narrow, even for this species. The sori keep their distance from the costa and so become almost marginal. The margin folds down against each sorus, protecting it just as the continuous fold protects the continuous fruiting surface of *Hymenolepis*. The same specialization, associated with the somewhat sunken and elongate sori, is likewise strongly suggestive of *Vittaria*.

EXPLANATION OF THE PLATE

PLATE I. *Angiopteris Brooksii* Copel. Photograph of a specimen collected in Sarawak by Dr. D. H. Campbell. (Photograph by E. Cortes, Bureau of Science.)

PLATE I. ANGIOPTERIS BROOKSII COPELAND.

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REVIEW

Christensen, Carl. Index Filicum. Supplementum 1906–1912. Hafniae: H. Hagerup. Pp. 1–132.

Christensen has published a Supplement to his invaluable Index Filicum, covering the ferns described, and the literature dealing with the names of ferns, during the seven years from 1906 to 1912. During this period, there have been proposed 33 new genera and subgenera, and 2,611 specific names. Of the species, Christensen regards 1,644 as entitled to recognition. The total number of species of ferns recognized at the end of 1912 is 7,411. Publication on ferns has been so active since the Index Filicum was printed that it had already become very difficult for writers on the subject to be familiar with the whole of it, and the Supplement is therefore second only to the Index itself in its value as a guide to those who would describe plants in this group. It appears that the publication of the supplement was made possible by the financial aid of Prince Roland Bonaparte, to whom, therefore, the thanks of all students of ferns are due.

The supplement is divided into two parts: First, the supplement proper, containing all new names and a few older ones overlooked in the preparation of the Index; and, second, the Corrigenda, containing corrections and additional synonyms to species adopted in the original Index. This arrangement is inconvenient and must have involved a large amount of additional work on the author's part, and appreciable additional expense. However, if it was not yet possible to publish a new edition of the Index, the plan adopted was the best possible, and nobody will criticize Christensen for not doing more than was possible.

The introduction notes the fact that a thorough revision of the generic nomenclature is very much needed, and the Supplement, in the form in which it appears, is the most striking single piece of evidence which has yet appeared of the pressing urgency of such a revision. There is, unfortunately, no present method of compelling writers on ferns to adopt any particular

system of nomenclature, and of preventing them from using novel or antiquated systems, which they themselves may recognize as unnatural.

It is presumably recognized by every writer on systematic botany that the multiplication of synonyms is in itself a nuisance, and that the publication of a synonym, except as it may be necessary in order to place a fern in the genus where it naturally belongs, or to correct the use of a generic name which under recognized rules of nomenclature is untenable, is not entitled to be regarded in any other way than as a nuisance. In this supplement, whole pages are taken up with the names of synonyms published without the chance that they will be generally recognized as valid names, and without any permanent result except to encumber literature. In these days, nobody, not even van Alderwerelt himself, believes that *Phegopteris* is a valid genus, including the species which he has transferred to it. There doubtless are people who believe that *Pleopeltis* is a valid genus; but a writer should be convinced on better evidence than is now available that *Pleopeltis,* if it is to be recognized as a genus, includes any ferns of the Eastern Hemisphere, before he loads the literature with nearly two pages of mere names. All pteridologists are probably agreed that *Polypodium,* in the sense of the Index Filicum, is a larger and more diverse genus than it will be permanently convenient to recognize. Most pteridologists, however, are disposed to wait until they know, from study of the ferns, what are the generic groups which are worthy of recognition; and only after they know the groups from the study of the ferns, to fall back on the literature for a decision as to the names which the groups should bear.

In the case of *Polypodium,* I have given this matter considerable study, and before van Alderwerelt published his wholesale transfers to *Pleopeltis,* had already published reasons for believing that the great group which he transfers cannot possibly bear the name which he has used. If *Pleopeltis* is a genus, it must be a very small one, and has probably no known species in the Malayan region. The Old World species must have a different name or different names. Leaving out of account the groups of ferns more or less related to *Drynaria, Lecanopteris,* and other generally recognized genera, there are three names to be considered for the remaining species; and among these, the choice is altogether a matter of judgment, depending upon the number of groups which are to be recognized. The larger number of species fall into the group in which many of them

have already been given names as *Phymatodes;* but there are a considerable number of species intermediate between this group and *Goniophlebium,* and *Goniophlebium* is an older generic name. It is my opinion that no natural line can be drawn between *Goniophlebium* and *Phymatodes,* and that therefore *Goniophlebium* is the better name of the two for the entire group. But the problem does not end here. *Selliguea,* as a generic name, antedates *Gonophlebium.* It is perfectly certain that the species commonly assigned to *Selliguea,* as a subgenus, are of diverse phylogenetic origin in the *Phymatodes* group, but it is not so certain that the smaller group, to which the name *Selliguea* was originally given, ought not to be retained as a genus. Pending a well-founded and positive opinion on this question, as a basis on which to decide whether *Goniophlebium* or *Selliguea* should be the generic name of the very large group, a botanist should be disposed to go very slowly in dissecting the old genus *Polypodium.*

Furthermore, the ferns of the American tropics must be taken into account in any attempt to rehabilitate these old generic names. A considerable number of American ferns have been described under the name of *Goniophlebium.* If *Goniophlebium* is made a genus in any natural sense, not one of these American ferns can be included in it, no matter how perfectly they may conform with the diagnostic characters assigned to the genus. There is no doubt whatever, at least in my mind, that these American ferns are genetically related to entirely distinct species and groups of *Eupolypodium.* If, therefore, our classification is really natural and a genus must be a group of related species, the so-called *Goniophlebium* of the American tropics can in no way bear the name of the real *Goniophlebium* of the Old World. The problem is further complicated by the fact that the species assigned to *Goniophlebium* in America do not themselves represent a single line of descent. They comprehend certainly two, and probably at least three, phylogenetically separate groups.

When the "thorough revision of the generic nomenclature" is attempted, it must be on the basis of a knowledge of the ferns themselves, and it is the need of just this kind of thorough revision which is emphasized by the Supplement to the Index Filicum. As illustrations, in order to use those of which I feel sure, I will call attention to the treatment of some of the genera to which I have given particular attention.

Acrosorus is a genus which I proposed as a necessary consequence of the recognition of the sense of the word genus which

has just been outlined. It is a small group of ferns, mostly rare species, but found from New Guinea to the Malay Peninsula, which are unquestionably related to certain species of *Eupolypodium*, and not to those species of *Polypodium* which represent the parental type of *Prosaptia*. Having separate origin in *Eupolypodium*, *Prosaptia* and *Acrosorus* cannot possibly be united into one natural genus or subgenus. Without violence to nature, both of them might be combined with *Polypodium*, and the only objection to this is one of convenience. Nobody who knows the ferns at all believes that *Prosaptia* and *Acrosorus* have any relative affinity with *Davallia*, and yet the Supplement, following the Index, continues to refer them to that genus.

Aglaomorpha again is a good natural group. The limits which should be assigned to it are a matter of judgment. It is decidedly more distinct from *Polypodium*, even from such a species as *Polypodium Heracleum*, than it is from *Dryostachyum*. *Dryostachyum* may be included in *Aglaomorpha*, or might be kept distinct if one chooses, but there is no reason for maintaining *Dryostachyum* and not *Aglaomorpha*. The treatment of *Thayeria* is unreasonable to the point of aggravation. Van Alderwerelt reduced it to *Drynaria*, by an obvious failure to recognize the real nature of the genus, as he proved by describing a perfectly good *Drynaria* in his "section" *Thayeria*. Christensen, although he cites a publication, accompanied by a photograph, which must make the real nature of *Thayeria* plain, has continued to treat it as a *Drynaria*. If he were to treat it as anything but a separate genus, the only reasonable course would have been to reduce it to *Polypodium*, for its nearest known affinity is certainly to his *P. meyenianum*, which I prefer to regard as *Aglaomorpha*. In his treatment of *Davallodes*, Christensen has tried to stand on both sides of a rather high fence. He includes in *Davallia* a species which happened to have a name there and not in *Microlepia*, even though the name was given by an author who did not distinguish between *Davallia* and *Microlepia*, but has transferred the species originally described in *Davallodes* to *Microlepia*, and has assuredly accomplished nothing beyond an addition to the list of synonyms.

In the treatment of *Loxogramme*, he has again kept free of the solid ground, reducing most of the species to *Polypodium*, but balking at *Loxogramme dimorpha*. But *L. dimorpha* is beyond any question one of the same group with the other members for which he provides new names. Either *L. dimorpha* is also a *Polypodium*, or it represents a new genus which

nobody can define, or *Loxogramme* as a whole is a valid genus. *Currania* has been treated in substantially the same manner.

In *Alsophila* and *Diplazium,* there are fourteen new names for species which I have described as *Cyathea* and *Athyrium.* When the thorough revision takes place, *Alsophila* and *Diplazium* will probably disappear, and these fourteen names will survive as useless synonyms. However, if Christensen had not published these names, some one else would have done so. Even after the most thorough revision, there will doubtless remain botanists who will publish new names, and perhaps still some who will publish two or three names at a time for the same species, even if they know that their names cannot be, and ought not to be, generally adopted.

E. B. C.

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THE PRESENT STATUS OF BOTANICAL EXPLORATION OF THE PHILIPPINES

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ONE MAP

The Philippine Archipelago presents a wonderfully rich flora, although one which at the present time is very imperfectly known in spite of the great amount of work that has been accomplished in the past thirteen years. Just how much remains to be done is perhaps fully realized only by those botanists most closely in touch with the situation. While the Archipelago is probably better known botanically than any other single part of the Malayan region, with the exception of Java, Singapore, Penang, and perhaps some parts of the Malay Peninsula, the very fact that current collections continue to present a high percentage of new forms is conclusive evidence that our present knowledge of the flora is very imperfect. In general, botanists working in temperate regions have very little conception of the immense richness of a tropical flora like that of the Malayan region. Many years of intensive botanical exploration are necessary before the flora of any single island, other than very small ones, can be thoroughly known. Compared with the greater part of the Malayan Archipelago, the flora of the Philippines is decidedly well known, and many of the islands, comparatively speaking, are well explored. Java is the only large island in the entire Malayan region of which the flora

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is approximately known, and yet much still remains to be done there. The floras of the great islands of Sumatra, Borneo, New Guinea, and Celebes, and of the numerous smaller islands that make up the Malayan Archipelago, comparatively speaking, are little known, yet enough is known to indicate that each island has an enormously rich and complex flora, and that each island, large and small, has from a small to a high percentage of endemism. The Malayan region, from the Peninsula to New Guinea, when thoroughly explored botanically, will present one of the richest floras, if not the richest flora of any region in the world, in families, in genera, and in species. I confidently expect that in the spermatophytes and pteridophytes alone the flora will be found to exceed 30,000 and will perhaps approximate 40,000 species. The Philippines are but a small part of the immense area covered by the Malayan Archipelago, yet the Philippine flora, when only fairly well known from present and future exploration, will certainly exceed 10,000 species of spermatophytes and pteridophytes. More than 40 per cent of the species already known from the Archipelago are endemic. There is no reason to consider that the Philippine flora is richer than that of any other part of the great area covered by the Malay Archipelago, and even if endemism is considerably lower in other islands and groups of islands than in the Philippines, some idea may be had of the immense number of species that are to be expected in the region extending from the Malay Peninsula and Sumatra to New Guinea.

If by the term botanically well explored we mean botanically well known in the sense that most of Europe and the eastern part of the United States is known botanically, then no single area of any appreciable size in the entire Philippine group, and for that matter in the entire Malayan Archipelago, can be considered as exhaustively botanized. In the entire Malayan region but three comparatively small areas can be considered well known botanically, and these are the Island of Singapore, that part of Java about Batavia and Buitenzorg, and that part of Luzon about Manila. The last, being naturally more familiar to me, will be briefly discussed simply to show what still remains to be done. In preparing my Flora of Manila,[2] an area covering approximately 100 square kilometers in the vicinity of the city was selected as the limits of the region to be covered. In this work 1,007 species are considered, all that were known

[2] Merrill, E. D., A Flora of Manila (1912) 1–490.

from the area up to the latter part of the year 1912. Since the publication of this work no attempt has been made to continue botanical exploration in the vicinity of Manila, yet casual collecting and observation in the past two years have added to the forms enumerated in the Flora of Manila representatives of three families, thirteen genera, and twenty-three species. It is absolutely certain that any continued intensive exploration of the area would add some scores of species to the list of those known from the vicinity of Manila, and yet the Flora of Manila was based on the collections accumulated during a period of ten years, with more than one year of systematic and intensive exploration of the area. What is true of Manila is undoubtedly true of the few other parts of the Malayan region that are well known botanically.

In the Philippines those regions that may be considered to be fairly, but not exhaustively, botanically explored are small in area and few in number. Under this head, in addition to the region about the city of Manila extending some miles inland to the east of Antipolo, we may also include a portion of the eastern slope of Mount Mariveles in Bataan Province, Luzon, and just across the bay from Manila; the region about the College of Agriculture at Los Baños, Laguna Province, Luzon; the region about Baguio, Benguet Subprovince, Luzon; and perhaps also the region about Bauco, Bontoc Subprovince, Luzon, and Mount Apo, District of Davao, Mindanao. These are the only areas in the Philippines where botanical exploration has been intensive and fairly continuous in all or most months of the year.

A point to be considered, in the botanical exploration of densely forested mountains in the Philippines, is that even on those mountains which have been visited by many botanists and collectors, such as Mounts Mariveles, Santo Tomas (Tonglon), Maquiling, Arayat, and Banajao, botanical exploration has been confined to very narrow strips from the base to the summit; sometimes to a single strip as on Santo Tomas, sometimes to several strips as on Mount Banajao. Other mountains, such as Mounts Halcon, Pinatubo, Data, Ugo, Pulog, Polis, Mayon, Iraga, Isarog, Malindang, Canlaon, Pulgar, Victoria, and Capoas, are known botanically from collections made by single or few collectors on hurried trips. In many cases our knowledge of the flora of certain mountains is based on material collected on single trips, and the area actually explored would at most average a few meters in width. The richest flora is not found on the lower slopes or the exposed peaks and ridges,

but on the broad slopes and in narrow ravines at intermediate points. Depending on the prevailing winds, exposure, rainfall, etc., the flora of one side of a mountain may be decidedly distinct from that of the opposite side, in some cases very radically different. Manifestly then, no single mountain in the Philippines can be considered botanically thoroughly explored, although some of them, such as Banajao, Mariveles, Santo Tomas, and Maquiling, have been ascended by very numerous collectors and botanists; in most cases only single slopes have been explored.

No complete summary of the Philippine flora has been published that is at all reliable. F.-Villar and Naves [3] admitted 4,479 species of flowering plants and ferns, but nearly 2,000 of the admitted species do not occur in the Philippines. Up to the close of the last century but a few more than 2,500 species were definitely known from the Philippines. A rather careful estimate made by me in the early part of the year 1909, considering only those forms that had been determined to the species, gave a total of 5,678. The great amount of work that has been accomplished during the past few years has vastly increased this list of known species, and my present estimate is somewhat over 7,000. It is confidently expected that when the Philippine flora is merely fairly well known the total number of species, excluding the cellular cryptogams, will be found to exceed 10,000. It is clear, also, that most of the future additions to our knowledge of the flora will be in the nature of new species, rather than in the discovery in the Archipelago of species already described from extra-Philippine specimens.

Our present knowledge of the Philippine flora is to a large degree based on the botanical collections assembled by the Bureau of Science. This herbarium now exceeds 150,000 mounted specimens, of which over 90,000 are Philippine. Accessions have been so numerous at times that it has been impossible, with our limited force, properly to study all the material received, and the result is that very many manifestly undescribed forms are represented in the collections by from one to several specimens that must be considered at a later date when there is opportunity to study the material or to revise various groups. The collections comprise not only the flowering plants and ferns, but also a very extensive series of fungi, mosses, scale mosses, and lichens. In exchanges a most liberal policy was adopted, and in the past thirteen years more than 240,000 duplicates

[3] Novis. App. Fl. Filip. 4 [3] (1880–83) 1–375.

have been sent to botanical institutions and botanists in Europe, America, Asia, and Australia. Most of our extra-Philippine material has been received in exchange for duplicates of Philippine plants.

At the present time botanical exploration of the Archipelago has progressed sufficiently to enable us to distinguish between those areas presenting little of botanical interest and those of special botanical interest. In general, little of special interest is to be expected in the costal vegetation, in the settled areas and in the open grass country at low and medium altitudes, and in the second-growth forest. All regions at high altitudes, except a very few well-explored mountains, no matter what the type of vegetation, and likewise most regions at medium altitudes will be found to present much of special interest, while virgin forest, no matter what its location, will always be found to yield a high percentage of novelties.

Whitford [4] has estimated that approximately one-third of the total land area of the Philippines is now covered with virgin forest, one-sixth by second-growth forest, 40 per cent is grassland, and 10 per cent is cultivated land. He has argued that all types of vegetation found in the Philippines to-day, outside of the virgin forest, owe their character to the presence of man, and I have considered more at length and tried to confirm this same proposition.[5] If our contention be correct, then two-thirds of the total land area of the Philippines to-day presents types of vegetation directly or indirectly influenced by the presence of man. The botanical distribution of the characteristic species of the various types of vegetation bears out the theory or contention. Two-thirds of the land area of the Philippines, namely, the settled areas, the open grassland, and the second-growth forests, have a flora remarkable for the high percentage of widely distributed species, and equally remarkable for the low percentage of endemic species. On the other hand, the virgin forest presents a very high percentage of endemism and a low percentage of species extending outside of the Archipelago. The inference is that most of the species in the settled areas have been purposely, accidentally, or some undoubtedly naturally introduced into the Philippines within very recent times—that is, since the advent of man in the Archipelago—and that the virgin forest represents the original vegetation of the Archipelago as unaltered by the presence of man. The virgin forest invariably

[4] Bull. Forest. Bureau (Philip.) **10** [1] (1911) 12.
[5] *This Journal* **7** (1912) *Bot.* 145–208.

contains much of special interest from a botanical standpoint, while vegetation of the settled areas consists chiefly of widely distributed and well-known species.

The Philippine flora, as a whole, is rather remarkable for its relatively high percentage of endemism. Somewhat over 40 per cent of all the species known from the Archipelago are confined to the group. However, this high percentage of endemism is found in the forested areas, not in the settled regions, the country covered with open grassland, or in the second-growth forest. The flora of the vicinity of Manila, a region presenting the characteristic vegetation of the settled areas at low altitudes, and a region where the original vegetation has been entirely destroyed, may be taken as fairly representative of the entire open country and settled areas at low altitudes in the Philippines. Most of the species found in and about Manila are of wide distribution in the Philippines in similar habitats, while in most settled areas in the Philippines at low altitudes there are but few species not found in or about Manila. The endemism of the Manila flora does not exceed 12 per cent. In the virgin forest the percentage of endemism approximates 60 per cent, and in some regions is probably higher than this. Over 80 per cent of the species found in and about Manila, a region characterized by the entire absence of any type of vegetation approaching virgin forest, extend to tropical Asia and the Malay Archipelago, and are likewise widely distributed throughout the Philippines. It is manifest, then, that all collectors should avoid intensive exploration of the settled areas, the open grassland, the costal regions, the cultivated areas, and to a large degree the regions covered with second-growth forest, and should devote as much time as possible to the vegetation of the virgin forest and to that of higher altitudes.

In considering the question of botanical exploration in the Philippines, it may be said that a few months of intensive work will in no case yield a complete representation of all the species found in a certain area. The reason is that, like most all tropical countries, the Philippines present, as to anthesis, a continuous sequence of species in all months of the year. Hence, thoroughly to explore any given area the collection of botanical material must be intensive and must be prosecuted in all months of the year. Even then, especially in the densely forested regions, it is physically impossible to locate all the different species, and the discovery of a certain form in flower or in fruit is frequently merely a matter of chance. The great size of the trees, the

density of the very complex vegetation, the abundance of vines, and the frequent occurrence of epiphytes in great quantities, especially above 600 meters altitude, all add to the difficulty of making an exhaustive collection or a collection that shall contain representatives of all the species found in a given area. Again one must take into consideration that a considerable number of species are irregular as to periods of anthesis, and may flower but once in several years, as many of the bamboos, or, like the buri palm (*Corypha*), but once in the life of the plant, which may be twenty-five years or more. While the period of anthesis of some species may extend over several days or weeks, other plants produce very ephemeral flowers, and such species may be entirely overlooked in a botanical survey of a given region unless the collector is so fortunate as to locate the species during its short period of anthesis.

In general, any collector should endeavor to secure a representative of all the species found in flower or fruit in the region in which he is working. However, it is well to make a distinction in regard to the regions to be first explored. In view of the data given above it is manifest that little of botanical interest will be found along the seashore, or anywhere at low altitudes in the Archipelago where the vegetation has been much disturbed by man; that is, the cultivated areas, waste places in and about towns, the open grassland, and the so-called *parang*, those areas covered with thickets and second-growth trees. Most of the species found in such regions are common, widely distributed, and thoroughly well known. The collector should give his most serious attention to the virgin forest and to the various types of vegetation found at and above an altitude of about 600 meters, for it is only in the virgin forest, or at medium and higher altitudes, that he can expect to find any high percentage of novelties, or species of special botanical interest.

Immense areas occur in the Philippines from which not a single botanical specimen has been secured. For those regions at low altitudes that are for the most part deforested, botanical exploration would be of little value, for the reasons already given. Thus, large parts of the Provinces of Cagayan, Isabela, Pangasinan, Tarlac, Pampanga, Bulacan, Nueva Ecija, Batangas, Tayabas, Cavite, Camarines, Albay, and Sorsogon in Luzon, and like areas on the Islands of Mindoro, Marinduque, Masbate, Catanduanes, Panay, Negros, Cebu, Bohol, and parts of Mindanao and Palawan will not repay botanical exploration; yet in every province and island mentioned where virgin forest exists, whether at low,

medium, or higher altitudes, undescribed forms will continue to be found in large or fairly large numbers, for many years to come.

The number of undescribed forms that are appearing in current collections is surprisingly great. Individual collections still continue to be received in which new species comprise from 10 to 20, or in some cases, even 25 per cent. Very many years of work are necessary before we shall know even approximately the total number of species growing in the Philippines.

Most botanists do not realize the urgent need of an early and intensive botanical exploration of countries like the Philippines, especially those areas now covered by virgin forest. With the rapid increase in population immense areas of virgin forest are annually being destroyed in the Malay Archipelago, and with this destruction of the original vegetation very many species are rapidly being exterminated. Within the memory of men now living the virgin forest has been destroyed over very large parts of eastern Negros to prepare the land for the cultivation of sugar cane. Only a few decades ago virgin forest occurred at or near the coast of eastern Negros, but now the cleared areas extend inland for at least 20 miles. When Blanco was writing his Flora de Filipinas, some time previous to the year 1837, it is evident that that forest extended very close to what is now the town of Angat where Blanco then resided; at the present time one must journey for many hours from Angat before reaching any type of vegetation that approaches the virgin forest in character. In our recent attempt to explore Amboina, with a view to re-collecting in their original habitats the species figured and described by Rumphius, the late Dr. C. B. Robinson found it quite impossible to locate a single tree of many of the species considered by Rumphius, as much of the original vegetation of Amboina had been destroyed since the time of Rumphius. Likewise the greater part of the island of Java, below an altitude of about 1,000 meters, has been entirely denuded of its original vegetation. As other islands become more densely populated the destruction of the original vegetation is accelerated. It is quite impossible to estimate how many species of plants have been exterminated by the destruction of the original vegetation over vast areas in the Malayan region, but the number is undoubtedly great. The factors causing this destruction of the virgin forest are more active to-day than at any time in the past, and very many species characteristic of the Malayan flora must be collected in the near future or not at all. The destruction of the

original vegetation of the island of St. Helena is a classical example that is known to most botanists, yet few botanists realize that the vegetation of immense areas in the Indo-Malayan region is now being destroyed or altered by much the same factors that were active in St. Helena.

In preparing the accompanying map, which is intended as a graphic representation of the present status of botanical exploration in the Philippines, the round dots indicate those areas from which only casual collections have been received; that is, collections made during hurried trips through the country, during stops of from a few hours to a few days in any particular place. Naturally collections made under such circumstances are far from exhaustive. In very many cases a dot indicates merely a small collection secured in a few hours' time; very many of these areas are in the coastal region or in the settled areas. The parallel lines represent those areas in which intensive collection has been carried on for one month or more, but not during all months of the year; such areas, generally speaking, can be considered fairly well known botanically. The few areas indicated by crosslines are those regions where botanical exploration has been fairly intensive, and where collections have been made during all months of the year, and these few areas are the only parts of the Philippines that can be considered as botanically well known.

ILLUSTRATION

PLATE I. Map of the Philippine Islands, showing the progress of botanical exploration.

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GENERA AND SPECIES ERRONEOUSLY CREDITED TO THE PHILIPPINE FLORA

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The species of flowering plants and vascular cryptogams definitely known from the Philippines to-day number somewhat over 7,000. As botanical exploration progresses, it is found that entirely new forms, or species previously described from extra-Philippine material, are constantly appearing in current collections, often in surprisingly large numbers. In spite of the great amount of work that has been accomplished on the flora of the Philippines, collections from little known parts of the Archipelago frequently present from 15 to 20 per cent of species as yet undescribed or at least of forms new to the Philippines. It is confidently expected that the flora of the Archipelago, when fairly completly known, will exceed 10,000 species.

While new forms are still common in current collections, our exploration of the Archipelago has now progressed to such a point that we have a practically complete representation of those forms that are of wide distribution at low altitudes in the Philippines; and we are now in a position to consider numerous species that have, from one cause or another, been erroneously credited to the Philippines by various authors.

It is very doubtful if any single area of similar size anywhere has had erroneously accredited to it so many species of plants as have been enumerated as Philippine, but which do not occur in the Archipelago. The sources of error in crediting extra-Philippine species to the Archipelago are several; and it is practically impossible to-day absolutely to eliminate all such sources of error in our current investigations. As our modern work is carried on with access to a fairly complete botanical library and a large collection of both Philippine and extra-Philippine botanical specimens, the chief source of error—that is, inaccurate identifications due to the misinterpretation of descriptions—has to a large degree been eliminated. Some species un-

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doubtedly continue to be erroneously credited to the local flora in our current work. It is only with the publication of comprehensive monographs that questions of synonymy and the limits of species can satisfactorily be settled, and unfortunately some monographs, even very modern ones, are exceedingly unsatisfactory in both respects.

It should constantly be kept in mind that the local botanists in the Spanish régime did their work under very unfavorable conditions, having but few botanical books, and up to the time of Sebastian Vidal, practically no botanical collections. Manila, previous to the year 1883, was entirely isolated from other botanical centers, and the local botanists, with the exception of Llanos, had no correspondence or intercourse with their colleagues working in Europe and in other countries.

While inaccurate identifications account for the great bulk of the species that have in the past been erroneously credited to the Philippines in botanical literature, a considerable number have been admitted due to inaccurate or misleading labels on herbarium material, or through the accidental mixing of labels and specimens.

It is unfortunate that most of the early investigations on the Philippine flora was accomplished by local botanists working in Manila, a city, at least up to a recent period, isolated from other botanical centers. It is equally unfortunate that the local Spanish botanists, with the exception of Llanos and Vidal, sent no botanical specimens to Europe, and preserved no herbarium material. The result is that somewhat over 1,200 species, actually described by Blanco, Llanos, and Fernandez-Villar, must be interpreted by the published descriptions alone, no type material being extant. As a general rule botanists working in European centers, having access to dried material only, and with no knowledge of actual floristic conditions in the Philippines, with no notes on size, habit, habitat, relative abundance, distribution, and native names of plants, have been unable satisfactorily to interpret many of the species described by local botanists working in Manila. To a still greater degree local botanists, working in Manila from descriptions alone, or from descriptions and figures, were not able properly to interpret the species described by European botanists.

The general result of the methods pursued by the local investigators of the Philippine flora, previous to the year 1883, was that numerous Philippine plants were referred to species, described from extra-Philippine material, which really do not extend to the Archipelago. Just how badly Philippine botany is bur-

dened with these numerous names is not evident to the casual investigator of the Philippine flora, but a recent consideration of the subject has shown that from this one source alone—mistakes in identification—more than 2,400 species have been accredited to the Philippines which do not occur in the Archipelago.

Previous to the year 1883 practically all work accomplished by local botanists was done with little or no correspondence with European botanists, with no comparisons of Philippine material with types preserved in European herbaria, with no preparation or preservation of herbarium material, and with very limited library facilities. Llanos was the only local botanist, before the arrival of Vidal, who preserved botanical material, who sent any specimens to Europe for comparison or for identification, or who corresponded with European botanists. Under these circumstances it is not strange that Blanco, Naves, Fernandez-Villar, and even Llanos, to whom we are indebted for most of the species erroneously credited to the Philippines, committed numerous errors in identifying and reporting their botanical material.

Blanco's "Flora de Filipinas [2]" was prepared under peculiar circumstances. The work was written in the Philippines, and the three editions were published in Manila. Blanco died in 1845, and of course had no part in the preparation of the third edition. The preparation of the manuscript of the first edition extended over many years, and the work was intermittent, as we learn from the author's own statement in the preface. Blanco complains that it was rare that residents of the Archipelago took any interest in botany, and that many looked on the subject with disdain. He closes with the following statement: "Mil veces me he fastidiado por esto mismo, y se han pasado años enteros sin dar una plumada en la Flora." According to Blanco's own statement, he commenced his investigations of the Philippine flora with but a single botanical publication, the "Systema Vegetabilium" of Linnaeus. Later he secured other works of Linnaeus, and at a still later date, Jussieu's "Genera Plantarum," and some other botanical works, the authors and titles of which are not mentioned by him. Between the publication of the first and second editions of his "Flora de Filipinas" it is probable that Blanco acquired the earlier volumes of DeCandolle's "Prodromus," this work being cited in the text although not mentioned in the introduction.

[2] Ed. 1 (1837) LXXVIII+1–857; ed. 2 (1845) LVII+1–619; ed. 3, 1–4 (1877–83).

Blanco described most of his species from fresh material, and but few from dried specimens that were transmitted to him by various correspondents. His field was exceedingly limited, most of his material being from the provinces near Manila: Rizal, Cavite, Laguna, Batangas, Bataan, Pampanga, and Bulacan. A few were from other provinces in Luzon, such as La Union, Ilocos Sur, Ilocos Norte, Cagayan, and Camarines, and still fewer from other islands, including Mindoro, Cebu, and Marinduque. His personal knowledge of the vegetation of the Philippines was practically limited to that of the settled areas, at low altitudes, in and about the towns, and most of the species described by him are not from the forested areas. Most of the species considered are of wide distribution in the Philippines, and a very high percentage equally common in the Indo-Malayan regions. While Blanco described some species from the primeval forest, such species are relatively not numerous, and with two or three exceptions are all from the lower altitudes. In no case did he describe species from the higher mountains. In several instances he described species without having seen specimens, basing his descriptions upon statements of individuals who claimed to have seen the plants in question.

Undoubtedly most of the species described from the settled areas were collected by Blanco himself, but it is very evident that he had little personal knowledge of the forested regions, and that he personally collected but little material from such regions. A clear idea of his methods of securing material from the forests is given by the following quotation from the first edition of his work, under *Quercus cerris* (p. 728): "Es cosa verdaderamente lamentable para los amantes del estudio de la naturaleza, el que ni ruegos, ni suplicas, ni el dinero sean suficientes para tomar conocimiento de estas preciosidades de los bosques filipinos."

Blanco and his immediate successors had no conception of the question of geographic distribution of plants; and without some knowledge of this phase of botany, with no herbarium (for there is no internal evidence in his work that Blanco preserved even temporarily any botanical specimens [3] of the plants that he described), with no extra-Philippine botanical material for com-

[3] Botanical material preserved in the herbarium of the Botanical Garden at Madrid, credited to Blanco by Colmeiro (Bosquejo Hist. Jard. Madrid 88), and by A. DeCandolle [La Phytographie (1880) 395], has been shown by Vidal [Rev. Pl. Vasc. Filip. (1886) 14] not to have been collected or transmitted by Blanco.

parison, with no corrrespondence with contemporaneous European botanists, with but a very few botanical books, and with no botanical training other than that he secured through his own efforts and his interest in the science, it is no wonder that he made many errors in identification. It is distinctly to Blanco's credit that he was correct in his identifications, generic and specific, in so many cases. Whatever criticisms may be levelled at Blanco's work, he must be credited with intense interest in botany, with great energy, with distinct ability, and with perseverance. It must also be kept in mind that the whole "Flora de Filipinas" is his work, and that nearly every statement included in it was the result of his own personal observations.

In the first two editions of the "Flora de Filipinas" Blanco considered a total of about 1,127 species and varieties, of which about 623 were intended as new species. In numerous cases species proposed as new in the first edition were reduced to older ones in the second edition, the reduction being sometimes correct and sometimes wrong; in other cases species interpreted in the first edition as those of other authors were described as new species in the second edition. In the two editions a total of approximately 450 species were intended to represent forms previously described by other authors, but in interpreting these Blanco was correct in but 150 cases, and wrong in about 300 cases, the errors in interpretation approximating 66 per cent.

Blanco's "Flora de Filipinas" is the first great source of error in accrediting to the Philippines species that do not occur in the Archipelago. The total number added by him is approximately 300, but most of these have already been satisfactorily reduced to their proper places by interpretation of Blanco's descriptions; a few remain, the status of which is still doubtful.

Blanco's immediate successor was Father A. Llanos, who attempted, with little success, to carry on the botanical work inaugurated by his more illustrious predecessor. From a standpoint of accuracy Llanos's work suffers greatly by comparison with that of Blanco, and the species he described—fortunately not very numerous—are as a rule more obscure than are those proposed by Blanco. His chief work was published in 1851, entitled "Fragmentos de algunas plantas de Filipinas," pp. 1–125, which, like Blanco's work, was printed in Manila. This work was supplemented by several shorter and less important papers published in various scientific periodicals in Europe. Llanos not only described new genera and species in his papers, but

referred numerous Philippine plants to forms previously described by other authors from extra-Philippine material, and thus reduced a considerable number of Blanco's species. In nearly all cases, however, his new genera and species are invalid, his interpretations of most of the species of older authors enumerated by him are wrong, and his reduction of Blanco's species equally erroneous. The result of Llanos's work was to add numerous synonyms to Philippine species, and to credit to the Archipelago numerous extra-Philippine species that do not extend to the Islands.

Fernandez-Villar and Naves have conveniently reprinted all of Llanos's botanical contributions, and this reprint comprises the first part of volume four of the third edition of Blanco's "Flora de Filipinas" (1880) XVIII+1–108. From an examination of this compilation it is evident that Llanos considered a total of 265 species, of which, however, only about 100 are accompanied by descriptions. The species that are actually described for the most part can satisfactorily be interpreted and their status can be determined where the descriptions are reasonably complete. Llanos added a very few short and imperfect descriptions in the papers published after the "Fragmenta," but for the most part the species simply enumerated by him do not occur in the Philippines, and they must be excluded in any critical consideration of the whole flora. In many cases there is no method of determining just what species Llanos intended his names to represent. In the last paper of the reprint mentioned above Llanos reduces 68 of Blanco's species, but 55 of the 68 reductions are certainly erroneous.

Blanco, in considering approximately 1,127 species and varieties, complicated Philippine botany by crediting to the Archipelago about 300 species, by misinterpretation of the descriptions of other authors; while Llanos, in considering 265 species, similarly added to our long list of excluded species about 155 names. As about 60 species were intended by Llanos to represent new species, his percentage of error in the interpretation of the species of older authors is decidedly greater than that of Blanco, approximating 75 per cent in contrast to Blanco's 66 per cent.

The most striking example of this phase of Philippine botany—that is, the accrediting to the Archipelago of species that do not extended to the Philippines—is that presented by the "Novissima Appendix" to the third edition of Blanco's "Flora de Filipinas," for which Fathers C. Fernandez-Villar and A. Naves are re-

sponsible. If we take into consideration the comparatively recent date at which this work was prepared (1875–83), it is difficult to explain the great mass of inaccurate data that was compiled by these authors. The errors of Blanco, working between the years 1805 and 1845, and of Llanos, working between the years 1850 and 1873, sink into insignificance when compared with those of the authors of the third edition of Blanco's work. In spite of the more recent date at which Fernandez-Villar and Naves worked, their errors are caused primarily by the same circumstances that influenced the work of Blanco and of Llanos. These causes were essentially a lack of knowledge of the Indo-Malayan flora; a lack of knowledge of the Philippine flora as a whole, due to insufficient botanical exploration; a lack of botanical material, both Philippine and extra-Philippine; a lack of botanical literature; and an inadequate conception of the principles of the geographic distribution of plants. Apparently neither author corresponded with European botanists, and they certainly sent no botanical material to Europe for identification or for comparison with types preserved in various public and private herbaria.

In the introduction to the "Novissima Appendix" the authors state that neither claims to be a botanist, that they had no access to herbaria nor to botanical books other than thirteen important works enumerated by them and others of less importance not cited by title. They admitted that they had no botanical material from the collections of any of the earlier Philippine explorers and collectors, and claimed that nobody, up to that date, had been able to preserve herbarium material against the attact of insects and the deteriorating effect of the humid climate of Manila. The work, then, was nominally based on an examination of fresh material, and no attempt was made to preserve herbarium material other than of those plants that could be secured only with difficulty, or of those that were especially essential to their work. No botanical material, on which this enumeration was primarily based, is extant, and the enumeration is trustworthy only in so far as its records are based on previously published references to Philippine plants in the works of various European botanists.

"The "Novissima Appendix" is a mere compilation, excellent from a bibliographical standpoint, but utterly untrustworthy as an enumeration of Philippine plants. A total of 4,479 species were admitted, distributed into 1,223 genera and 155 families. Of these at least 1 family and about 116 genera have no known

representatives in the Archipelago, and about 1,948 species do not occur in the Philippines, or at least have not been found here in spite of the vast amount of botanical work that has been accomplished on the Philippine flora in the past thirty years.

All reductions of Blanco's species, made by Fernandez-Villar and Naves, must be considered with great caution; for, while most of the reductions are correct as to the genus, they are very frequently incorrect as to the species.

In most cases an admitted species is followed by the indication that the authors had seen living specimens, usually with an indication of the island, province, and town in which the plant was alleged to have been seen, and frequently with the citation of native names. Some admissions are based on actual herbarium specimens from the collections of Vidal, but where these have been checked on Vidal's specimens, the identifications are usually found to be wrong. It seems to be apparent that the authors in compiling the "Novissima Appendix" took the standard books that were available to them, various monographs, Miquel's "Florae Indiae Batavae," Hooker's "Flora of British India," so far as published, etc., and from an examination of the descriptions, credited to the Philippines those species they thought ought to grow in the Archipelago. In almost no case is a reduction of Blanco's species queried, nor is a specific identification qualified by the addition of a question mark.

The result of the publication of the "Novissima Appendix" was the accrediting to the Philippines of no less than 1,950 species that do not occur in the Archipelago. Naturally the authors were correct in admitting very many widely distributed Indo-Malayan species as Philippine, as between 75 and 80 per cent of the species found in the settled areas of the Archipelago extend to the Malayan Archipelago and to tropical Asia. On the other hand, however, the authors of the "Novissima Appendix" were quite unaware of the high percentage of endemism of the Philippine flora taken as a whole. This endemism averages somewhat over 40 per cent for the entire flora, and for the areas still covered with virgin forests perhaps over 60 per cent. In referring Philippine sylvan species to extra-Philippine forms, Fernandez-Villar and Naves were usually wrong. The "Novissima Appendix" cannot be considered in any respect a reliable compilation or one that presents any correct conception of the constituents of the Philippine flora as the flora was known in 1883.

The following table shows the approximate number of extra-

Philippine species that were erroneously credited to the Philippines by the Spanish botanists working in Manila.

Author.	Approximate number of species considered.	Erroneous identifications.	Error in interpreting species of older authors.
			Per cent.
Blanco	1,127	300	66
Llanos	265	155	75
F.-Villar and Naves	4,479	1,958	44
Total	5,871	2,413	
Average			61

These four authors have burdened Philippine botanical literature with the names of approximately 2,413 species, originally described from extra-Philippine material, but which have never been found in the Archipelago. There is no reason to believe that any considerable number of them ever will be found here. They were admitted through misconception of species and misinterpretation of descriptions of species. Those actually described by Blanco and Llanos, for the most part, can be reduced to their proper places by interpretation of the species from the descriptions; those admitted by Llanos and by Fernandez-Villar and Naves, by simple enumeration and no descriptions, can for the most part never properly be reduced, and must, in the event of a future critical consideration of the Philippine flora, be ignored, or merely mentioned as excluded species. No attempt is here made to enumerate these very numerous species that have thus been erroneously credited to the Philippines through misinterpretation of descriptions.

The chief source of error in wrongly admitting extra-Philippine species as Philippine has been by misinterpretation of descriptions. That this source of error has been a very large factor in the older botanical literature of the Philippines is manifest from the above statements. Not until a few years after the arrival of Sebastian Vidal in the Philippines was the local botanical work placed on a logical basis; that is, the actual collection and proper preservation of botanical material, and the comparison of this material with types and authentically named specimens in European herbaria. Vidal's plan was formulated in 1882, and his studies in European herbaria were executed in 1883–84. As a result the errors made by Vidal are insignificant and scarcely need consideration.

In the very numerous published papers on the Philippine flora issued since 1902, involving over 250 titles, in which nearly all

the species definitely known from the Philippines have been mentioned, less than 100 of the species enumerated as Philippine have been shown to have been admitted on erroneous identifications. In our current work corrections are published as errors are detected, and future corrections are to be expected as opportunity is had critically to compare current collections of Philippine plants with types and authentically named specimens. Due to the differences in individual opinion as to what constitutes a species, and the well-known difficulties in interpreting species briefly described by the older authors, it is not to be expected that all errors have been eliminated in our recent work on the Philippine flora. Errors are now more apt to be on the side of too freely describing new species, than in erroneously referring recently collected Philippine material to Malayan and Asiatic species previously described.

A less important source of error is that of wrongly or imperfectly labelled botanical material in various herbaria. Here may well be considered also those errors due to the inadvertent interchange of labels, such mixtures not being uncommon in large herbaria. The chief Philippine collection in which mixed labels occur is that secured by the naturalists of the Malaspina Expedition, including material collected and prepared by both Haenke and Nee. A number of specimens cited by Cavanilles, Lagasca, and Presl, as Philippine, from Nee's and Haenke's collections, certainly never originated in the Archipelago, and the Philippine records are due to erroneously labelled specimens. Most of the species, thus erroneously recorded as Philippine, are described in Cavanilles's "Icones" and in Presl's "Reliquiae Haenkeanae."

The Malaspina Expedition, 1789–1794, proceeded from Spain to the east coast of South America, around Cape Horn, and northward along the coast to a point north of Sitka, Alaska, thence southward to Acapulco. From Acapulco the ships proceeded to Manila via Mulgrave (=Milne) Island (Marshall Islands) and Guam; from Manila southward to the southern point on New Zealand, thence to Sydney and from Sydney to Callao, Peru, via the Tonga Islands. From Callao the expedition proceeded around Cape Horn to Spain. Botanical collections were made at all, or at most points, where stops were made. Colmeiro [4] is authority for the statement that the collection of Nee alone comprised over 10,000 species, of which 4,000 were new.

[4] La botánica y los botánicos de la península Hispano-Lusitiana (1858) 182.

It is most peculiar that the collections of both botanists connected with the Malaspina Expedition, Luis Nee and Thaddeus Haenke, should contain many erroneously labelled specimens. Comparatively few of Nee's specimens have been cited in botanical literature, as the collection has not been available except to a few botanists in Madrid. A very few species were described by Nee himself, some by Lagasca, and a considerable number by Cavanilles. Haenke's material, now mostly at Vienna, Prague, Berlin, and St. Louis, has been more generally available to botanists than has that of Nee. Among the comparatively few Philippine or presumed Philippine forms considered by these botanists a relatively high percentage was erroneously accredited to the Archipelago; on the other hand, some forms manifestly originating in the Philippines were accredited to Mexico, California, and to South America. This statement holds true for the collections of both Nee and Haenke. For example, *Ophioglossum pendulum* Linn. is credited by Cavanilles [5] to South America "in Regno Quitensi," but the species does not occur in America, its range being from India to Malaya and Polynesia; Nee's specimen undoubtedly originated in the Philippines or in Guam. *Alloteropsis distachya* Presl [6] "Hab. ad Monte-Rey in California" is *Axonopus semialatus* Hook f. (*Panicum semiatatum* R. Br.), which does not occur anywhere in America, but which is abundant in the Philippines, and extends from Africa through tropical Asia and Malaya to tropical Australia; Haenke's specimen on which the California reference was based was undoubtedly from the Philippines. *Polypodium irregulare* Presl [7] "Hab. in Mexico" is the Philippine *Tectaria* (*Aspidium*) *irregularis* Copel., a species that is originated in the Philippines, certainly not in Mexico. *Malaspinaea laurifolia* Presl "Habitat in regionibus occidentalibus Mexici" is the Indo-Malayan *Aegiceras corniculatum* (Linn.) Blanco; Haenke's specimen certainly never originated in Mexico, but was either from the Philippines or Guam. Just how many more similiar cases there are in Presl's "Reliquiae Haenkeanae" can be determined only by a careful study and comparison of his types.

It seems, however, that comparatively few Philippine plants were erroneously credited to various parts of America by Presl and by Cavanilles. In contrast, at least 35 species based on

[5] Ic. 6 (1801) 73.
[6] Rel. Haenk. 1 (1830) 343.
[7] L. c. 1 (1825) 25, *t. 4, f. 3.*

material from various parts of America were indicated as Philippine by Haenke, Cavanilles, and Lagasca; and it is probable that the list will be somewhat extended by a critical study of Presl's types. A few specimens manifestly originating in Australia, collections of Nee, have been cited as Philippine, such as *Chloris dolichostachya* Lag. and perhaps some of Cavanilles's species of *Aristida*.

Two later collections are noteworthy as being a source of error in Philippine records, that of Hugh Cuming, 1836–40, and the one made by Thomas Lobb. The source of error in Cuming's collection was that the entire collection was distributed with printed labels bearing the data "Ins. Philippinae 1841," although between 400 and 500 numbers did not originate in the Philippines at all. Some of the ferns between Nos. 1 and 434 were not from the Philippines; Nos. 2052, 2053 to 2058, and 2252 to 2443, inclusive, were from Malacca, Singapore, and Sumatra; while Nos. 2444 to 2464, inclusive, were from St. Helena. In distributing his material into sets, Cuming apparently planned to arrange his collections in natural groups before numbering his specimens. Thus the vascular and cellular cryptogams, the *Orchidaceae*, *Loranthaceae*, and *Ficus* were segregated and for the most part numbered in sequence. This plan was not followed out, however, and most of the collection was numbered by localities. To illustrate his method of arranging his duplicates for distribution, it is only necessary to cite a few cases. Cuming's numbers 435 to 667 were from Calawan, Province of Laguna, Luzon. In distributing this material he completed the label on each set of duplicates only for the first one for the locality; thus 435 would be indicated as from Calawan, or from the Province of Laguna, Luzon. No other labels were completed until all the plants from that locality were distributed. The first label for a new locality, i. e. 678 from the Province of Tayabas, Luzon, was filled out, but no others until another change of locality, which was 695, the Island of Corregidor. It was expected that the subscribers to the sets would complete the labels as to the localities before distributing the plants into herbaria; but this seems rarely to have been done. It is then not surprising that specimens from this old Cuming collection still continue to be cited as Philippine although they may not have originated in the Archipelago. So far as the labels show, in many herbaria, practically the entire Cuming collection is Philippine, and the average working botanist cannot be expected to know all the minute details

regarding the labelling of each set of exsiccata that he has to handle.

Rolfe [8] has recently published a short account of the localities of Cuming's Philippine plants, but he gives merely the inclusive numbers that are from the Philippines, and those of the collection that were from extra-Philippine localities. As the localities, islands, and provinces in which the Philippine specimens were collected are frequently of great importance in our local work on the Philippine flora, the following list copied from that prepared by Cuming himself at the request of Sir William Hooker, and preserved in Hooker's correspondence at Kew, is here presented:

1–434. Cryptogams, apparently distributed with properly prepared labels. Most of the species are from the Philippines, a few from Malacca, Singapore, etc.
435–667. Calauang, Province of Laguna, Luzon.
678–694. Province of Tayabas, Luzon.
695–702. Island of Corregidor [a small island at the entrance of Manila Bay].
703–725. Province of Tondo [= Rizal], Luzon.
726–749. Provinces of Pampanga and Bulacan, Luzon.
750–833. Province of Tayabas and the mountains of St. Cristobal and Maijaijai [i. e. Mount Banajao], Luzon.
834–947. Province of Albay, Luzon.
948–1039. Province of Pangasinan, Luzon.
1040–1112. Not localized, but probably from the Province of Zambales, Luzon, judging from the species represented.
1113–1182. Province of South Ilocos [Ilocos Sur], Luzon.
1183–1260. Province of North Ilocos [Ilocos Norte], Luzon.
1261–1380. Province of Cagayan, Luzon.
1381–1454. Province of Nueva Ecija, Luzon.
1455–1478. Province of South Camarines [Camarines Sur], Luzon.
1479–1603. Island of Mindoro.
1604–1673. Province of Misamis, Mindanao.
1674–1732. Island of Samar.
1733–1757. Island of Leyte.
1758–1789. Island of Cebu.
1790–1810. Island of Negros.
1811–1857. Island of Bohol.
1858–2153.[9] Philippine material, not localized [exceptions 2052; 2053–2058].
2052. Malacca.
2053–2058. Singapore.
2252–2399. Malacca.
2400–2427. Singapore.
2428–2443. Sumatra.
2444–2464. St. Helena.

[8] Kew Bull. (1908) 116–119.

[9] See Vidal Rev. Pl. Vasc. Filip. (1885) 83: "2154–2242 Criptogamas celulares." These were chiefly from the Philippines.

While the erroneous citation of a considerable number of Cuming's plants as Philippine was due to the fact that he distributed the entire collection with Philippine labels, only certain labels being filled out as to localities as explained previously, the case presented by the collections of Thomas Lobb is decidedly different. Lobb was a professional orchid collector, who visited Singapore, Java, Borneo, and Luzon. In connection with his search for living orchids, Lobb also made a general botanical collection, preparing from one to several duplicates of each species secured. It has been found that a certain specimen labeled in the Kew herbarium, for instance, as originating in Luzon, may be represented in other herbaria by a duplicate labeled "Java," "Borneo," or "Singapore."

Vidal [10] clearly indicates the doubt that existed in his mind as to the propriety of admitting as Philippine those species that were credited to the Archipelago solely on the basis of specimens collected by Lobb and labelled "Luzon:" "[Las plantas de] Lobb son pocas en número por haber explorado dicho viajero principalmente Borneo, Malaca y el archipiélago malayano. Como se observa más adelante, al citarlas en la lista de revisión, sus localidades son poco seguras, sin duda por haberse confundido con las remitidas desde los paises vecinos al Archipiélago;" "Como se ha indicado ya, las localidades de las plantas de Lobb no merecen entera confianza, asi toda especie con solo ejemplares de este colector queda algo dudosa para nuestra flora."

The mixture of labels in Lobb's collection can be explained only on the assumption that it was deliberate in order to obscure the regions from which he may have secured valuable commercial orchids; this statement does not necessarily infer that Lobb himself was responsible for the mixture. It has been assumed that the set of Lobb's plants deposited in the Kew herbarium are correctly labeled, but this is certainly not the case. In a number of cases species have been ascribed to the Philippines solely on the basis of Lobb's specimens labeled "Luzon," and the Philippine flora has thus been enriched by such species as *Loranthus retusus* Jack, *Eurycoma longifolia* Jack, *Archytaea vahlii* Choisy, *Leucopogon malayanus* Jack, *Embelia myrtillus* Kurz, *Fagraea ligustrina* Blume, *Anisophyllea disticha* Hook., and *Ilex lobbiana* Rolfe. Of these the genera *Eurycoma*, *Archytaea*, and *Anisophyllea* have no known representatives in the Philippines, and none of the species enumerated above have ever been collected in the Philippines since they were accredited to the Archi-

[10] Rev. Pl. Vasc. Filip. (1886) 9, 173.

pelago by the manifestly erroneous labeling of Lobb's specimens. On the other hand, specimens that Lobb certainly collected in Luzon have been described as new species and accredited to other regions. As an example may be cited *Antidesma lobbianum* Muell.-Arg., much better *A. rostratum* var. *lobbianum* Tul., as originally described, which was credited to Java, with the citation of *Lobb 460*, this specimen in the Paris herbarium appearing as Javan; in the Kew herbarium the same number of Lobb's collection is labeled Luzon. The species, or variety, has never been found in Java,[11] but has been collected several times in the vicinity of Manila. It is very similar to the Philippine *Antidesma rostratum* Tul., and I believe it to be merely a form or variety of Tulasne's species. It was probably separated from *Antidesma rostratum* by Tulasne merely because *A. rostratum* was Philippine, and the variety *lobbianum* Tul., was supposed by him to have originated in Java. *Hydrangea lobbii* Max. in Mém. Acad. Pétersb. VII 10 (1867) 15 was credited by Maximowicz to Java on the basis of his specimen of Lobb's collection so labeled; the Kew specimen of the same collection is labeled Luzon, and this is certainly correct, as the species is common and widely distributed in the mountains of the northern Philippines, but has never been found outside of the Archipelago. *Clethra lancifolia* Turcz. in Bull. Soc. Nat. Mosc. 36 (1863) 231 was based on *Cuming 855* from Luzon, with the citation of *Lobb 449* from Singapore. Lobb's specimen was certainly from Luzon, as the species is quite unknown from Singapore, but is a common endemic species in the mountains of the Philippines.

It is evident that species that are credited to Luzon, Borneo, Singapore, or Java, solely on the authority of Lobb's specimens so labeled, should not be adopted as belonging to the floras of the respective islands without in each case a critical consideration of the floras of the other three islands involved.

While it is, of course, quite impossible to prove absolutely that the species enumerated below actually do not occur in the Philippines, at least there is no botanical material extant, that we know certainly to be from the Philippines, representing any species of the entire list, except *Neptuma oleraceae* Lour., *Eranthemum crenulatum* Nees, and *Clerodendron villosum* Blume. All the evidence at present available leads me to exclude all the species enumerated below, with these 3 exceptions. The present list of species excluded on account of erroneous or insufficient labels

[11] See J. J. Smith in Koord. & Valet. Bijdr. Boomsoort. Java 12 (1910) 290.

comprises 74 species, and of the list, the following genera have no known representatives in the Archipelago: *Bouteloua* (including *Eutriana*), *Polyschistes* (*Pentarraphis*), *Philydrum, Arundina, Bromheadia, Sebastiana, Eurycoma, Archytaea, Ionidium, Anisophyllea, Baeckea, Rhodamnia, Kibessia, Anplectrum, Marumia, Pternandra, Allomorpha, Baduśa, Pharetranthus* (*Pterobium*), and *Tristicha.*

POLYPODIACEAE

ACROSTICHUM SPATHULATUM Bory; Presl Rel. Haenk. 1 (1825) 15 "Hab. in insula Luzon ? Sorzogon ?" = *Elaphogolossum spathulatum* (Bory) Moore. The Haenke specimen was probably not from the Philippines, but from tropical America. The species is unknown as Philippine.

NEPHRODIUM HIPPOCREPIS Presl Rel. Haenk. 1 (1825) 35 "Hab. in insula Sorzogon" = *Aspidium hippocrepis* (Jacq.) Sw., a tropical American species. Haenke's specimen labeled "Sorzogon" was probably from South America or Mexico, not from the Philippines.

PTERIS ? ALATA Presl Rel. Haenk. 1 (1825) 56 "Hab. α in Guajaquil; β in Guajaquil et γ insula Luzon." This species of doubtful status may have been from Luzon, but was more probably from South America.

SCHIZAEACEAE

LYGODIUM VOLUBILE Sw.; Presl Rel. Haenk. 1 (1825) 73 "Hab. in insula Sorzogon." As this species is supposed to be exclusiely American, Presl's Sorsogon record was probably based on an erroneously labeled specimen. The record may have been based on a wrong identification.

GRAMINEAE

ANDROPOGON ERIOSTACHYS Presl Rel. Haenk. 1 (1830) 339 "Hab. in insulis Philippinis." This is a species of tropical America, *Andropogon ternata* Nees var. *eriostachyus* Hack. Haenke's specimen certainly never originated in the Philippines.

ARISTIDA LUZONIENSIS Cav. Ic. 5 (1799) 45, *t. 470, f. 2.* "Habitat in insula Luzon altera ex Philippicis." No known Philippine species of *Aristida* at all approaches the form figured and described by Cavanilles, so that it is probable that Nee's specimen did not originate in the Philippines, but in America or possibly in Australia.

ARISTIDA RIGIDA Cav. Ic. 5 (1799) 44, *t. 469, f. 2.* "Habitat in insulis Philippicis." Undoubtedly not Philippine. The note given above under *A. luzoniensis* Cav. applies here.

ARISTIDA MURINA Cav. Ic. 5 (1799) 44, *t. 469, f. 1.* "Habitat in Mindanao insula prope Samboangan [Zamboanga]." This is most certainly not a Philippine form. The note given above under *Aristida luzoniensis* Cav. applies here.

AVENA STERILIS Linn.; Presl Rel. Haenk. 1 (1830) 253 "Hab. in insulis Philippinis." The Philippine record was certainly based on an erroneously localized plant. The genus *Avena* is unknown in the Phiilppines except for occasional specimens of *A. sativa* from introduced grain.

BOUTELOUA SIMPLEX Lag. in varied. Cienc. 2 [4] (1805) 141 "Peruv.; Ins.

Philipp." ex Index Kewensis. This Philippine record was certainly based on an erroneously localized specimen; the genus and species is confined to North and South America.

BROMUS LUZONIENSIS Presl Rel. Haenk. 1 (1830) 262 "Hab. in Luzonia" = *Triticum luzoniensis* Kunth. This is a species of doubtful status, but if properly placed in either *Bromus* or *Triticum*, then certainly not a Philippine plant. Presl's specimens were probably from tropical America.

BROMUS PALLENS Cav. Ic. 6 (1801) 67, *t. 591, f. 1.* "Habit in Maniliae viciniis, ibique *Acanthus ilicifolius.* Nee legit." This is apparently a true *Bromus*, but there is no reason to believe that it originated in the Philippines. The genus *Bromus* is represented in the Philippines by but two known species, one indigenous, and one introduced European weed, neither occurring below an altitude of 1,500 meters in the Archipelago. Nee's "Manila" specimen was probably from South America, Mexico, or California.

CHLORIS RUFESCENS Lag. Varied. Cienc. 2 [4] (1805) 143. "Insulae Philippinae" ex Kunth. I have not seen the original description; probably not a Philippine plant.

CHLORIS DOLICHOSTACHYA Lag. Gen. et Sp. Nov. (1816) 5. Credited by Lagasca to the Philippines, but the specimen (probably collected by Nee) was undoubtedly from Australia, not from the Philippines. Identical with the Australian *Chloris truncata* R. Br., accordng to Link.

CHLORIS CRINITA Lag. Varied. Cienc. 2 [4] (1805) 143 "Insulae Philippinae" ex Kunth. From the description apparently not a Philippine plant. I have not seen Lagasca's original description, but the species was probably based on specimens collected by Nee.

CYNODON TENER Presl Rel. Haenk. 1 (1830) 291 "Hab. ad Sorzogon Luzoniae" = *Chloris tener* Scribn in Rept. Mo. Bot. Gard. 10 (1899) 41, *t. 40.* A species very closely allied to, if not identical with, the American *Chloris petraea* Sw. Haenke's specimen, on which Presl's species was based, was certainly not from the Philippines.

EUTRIANA CURTIPENDULA Trin. = *Bouteloua curtipendula* (Michx.) Torr. The Philippine record for this species was probably based on *Bouteloua racemosa* Lag. Whatever the origin of the Philippine record, it was certainly based on an erroneously localized specimen. The species is known only from North America.

ISCHAEMUM MINUS Presl Rel. Haenk. 1 (1830) 329 "Hab. in insulis Philippinis." The specimen is *Ischaemum urvilleanum* Kunth, a South American species. Haenke's specimen certainly never originated in the Philippines.

PANICUM STIPATUM Presl Rel. Haenk. 1 (1830) 297 "Hab. in Mexico, Luzonia ?" The specimen is the American *Digitaria setosa* Desv., and undoubtedly came from Mexico, certainly not from Luzon.

PANICUM LEUCOPHAEUM HBK.; Presl Rel. Haenk. 1 (1830) 298 "Hab. in Mexico, in Luzonia." The Luzon record was certainly based on an erroneously localized plant; nothing approaching the species is shown from the Philippines.

PASPALUM CHRYSOTRICHUM Presl Rel. Haenk. 1 (1830) 211 "Habitat in Luzonia." From the description apparently a form of the tropical American *P. aureum* HBK. The Luzon specimen was undoubtedly from tropical America, not from the Philippines.

PASPALUM ? FILIFORME Sw.; Presl Rel. Haenk. 1 (1830) 214 "Hab. in Luzonia ? Mexico." The specimen is *Digitaria filiformis* Delile, an American species.

PASPALUM FUSCUM Presl Rel. Haenk. 1 (1830) 214 "Hab. in Luzonia ? in Peruviae montanibus huanoccensibus ? Mexico ?" = *Syntherisma fusca* Scribn. = ? *Digitaria longiflora* Pers. The specimen on which Presl's species was based may have been from Luzon, but it is more probable that it was from tropical America. A species of doubtful status.

PASPALUM MOLLE Presl Rel. Haenk. 1 (1830) 213 "Hab. in Luzonia" = *Panicum mollicomum* Kunth =*Syntherisma molle* Scribn. I have seen no Philippine material agreeing with Presl's description. The "Luzon" specimens were probably from tropical America.

POLYSCHISTES PAUPERCULA Presl Rel. Haenk. 1 (1830) 294, *t. 41, f. 12* "Hab. in insula Luzonia" = *Pentarrhaphis* sp. The specimen on which this genus and species was based was certainly not from the Philippines, but was undoubtedly from Mexico.

SETARIA GLOBULARIS Presl Rel. Haenk. 1 (1830) 314 "Hab. in insulis Philippinis." The sheet of this species in the herbarium of the Missouri Botanical Garden consists of three species, *fide* Scribner, *Setaria caudata* Lam., *S. composita* Kth., and one undeterminable; *S. caudata* and *S. composita* are American forms, so that Presl's *Setaria globularis* probably originated in Mexico, not in the Philippines.

SPOROBOLUS SCOPARIUS Presl Rel. Haenk. 1 (1830) 243 "Hab. ad portum Sorzogon [Luzon]." Nothing at all resembling the species described by Presl is known from the Philippines. The specimens on which the species was based were probably from tropical America, not from the Philippines.

CYPERACEAE

CAREX HAENKEANA Presl Rel. Haenk. 1 (1828) 205 "Hab. in insulis Philippinis" = *C. pseudo-cyperus* L. var. *haenkeana* Kükenth. This form is widely distributed in extra-tropical South America, but has never been found in the Philippines. Presl's specimen labeled "Philippines" was undoubtedly from Chile.

FIMBRISTYLIS CYMOSA R. Br.; C. B. Clarke in Philip. Journ. Sci. 2 (1907) Bot. 97 "Toubonia (*1483 Cuming*) in hb. Kew (a false number)." This specimen was not from the Philippines as Clarke supposed, but apparently from Cuming's earlier Polynesian collection as the printed label bears the date 1831; Cuming's Philippine plants were collected between 1836 and 1840, and distributed in 1841.

ERIOCAULACEAE

ERIOCAULON TRUNCATUM Ham.; Ruhl. in Engl. Pflanzenreich 13 (1903) 107. "Philippinen (Cuming 2326)." The specimen was from Malacca, not from the Philippines.

PHILYDRACEAE

PHILYDRUM LANUGINOSUM Gaertn.; Caruel in DC. Monog. Phan. 4 (1881) 3. "Manilla (Cuming!)" is an error; the specimen was from Malacca, not from the Philippines. No representative of the family is known from the Philippines.

ORCHIDACEAE

DENDROBIUM METACHILINUM Reichb. f. in Bonplandia 3 (1855) 222 "2067 Cuming Phil." This species has been credited to the Philippines by several authors on this number of Cuming's collection. The specimen was from Malacca according to Cuming's own list of localities preserved in Sir William

Hooker's correspondence at Kew. It has been collected since in Malacca, but has never been found in the Philippines. Cuming's specimen is correctly localized by Kränzlin.[12]

ARUNDINA SPECIOSA Bl. This species has been credited to the Philippines by several authors [Vidal Phan. Cuming. Philip. (1885) 150, Rev. Pl. Vasc. Filip. (1886) 269; Rolfe in Journ. Bot. 23 (1885) 215], by citation of *Cuming 2058*. The specimen was from Singapore, not from the Philippines, according to Cuming's own list of localities. No representative of the genus is known from the Philippines.

BROMHEADIA PALUSTRIS Lindl. This species has been credited to the Philippines by Vidal on the basis of *Cuming 2054* [Phan. Cuming. Philip. (1883) 150, Rev. Pl. Vasc. Filip. (1886) 270]. This number of Cuming's collection was from Singapore, not from the Philippines. No representative of the genus is known from the Philippines.

The following species of *Orchidaceae*, originally credited to the Philippines on the basis of Cuming's plants, are hardly worthy of consideration here, as all have been found in the Archipelago by recent collectors: *Eulophia squalida* Lindl. (*Cuming 2053*), *Spathoglottis plicata* Bl. (*Cuming 2055*), and *Sarchochilus amplexicaulis* Reichb. f. = *Thrixspermum amplexicaule* Reichb. f. (*Cuming 2056*). All of these numbers of Cuming's collection were from Singapore, not from the Philippines, according to Cuming's own list of localities in Sir William Hooker's correspondence at Kew.

LORANTHACEAE

LORANTHUS RETUSUS Jack; Vidal Rev. Pl. Vasc. Filip. (1886) 232. This was admitted as Philippine on the authority of a specimen collected by Lobb, and localized as "Luzon." The species has not appeared in our comprehensive collections, and can safely be excluded. Lobb's specimen was probably from Singapore, Borneo, or Java.

SANTALACEAE

HENSLOVIA PHILIPPINENSIS A. DC. in DC. Prodr. 14 (1887) 631. "In Philippinis (Cuming 2255 in h. Boiss.)." The specimen was from Malacca, not from the Philippines.

PROTEACEAE

HELICIA CASTANEAEFOLIA Meisn. in DC. Prodr. 14 (1857) 441. "In ins. Philippinis (Cuming 2338!)." The specimen was from Malacca, not from the Philippines.

PODOSTEMONACEAE

TRISTICHA BIFARIA Presl Rel. Haenk. 1 (1827) 86 "Hab. in insulis Philippinis ?" It is suspected that this is *T. hypnoides* Spr., and that Presl's specimen originated in tropical America. No representative of this family has been found in the Philippines.

LEGUMINOSAE

BAUHINIA LUNULARIA Cav. Ic. 5 (1799) 4, *t. 407*. "Habitat in Calavan [Prov. Laguna, Luzon] et in Acapulco [Mexico] viciniis." This is most certainly not a Philippine *Bauhinia*. Nothing approaching it appears in our

[12] Engl. Pflanzenreich 45 (1910) 182.

comprehensive collections, and it manifestly belongs in the section *Casparia*, all of which are from tropical America, chiefly Mexico.

BAUHINIA SUBROTUNDIFOLIA Cav. Ic. 5 (1799) 4, *t. 406*. "Habitat in Calávan [Prov. Laguna, Luzon] duodecem leucis a Manila et etiam in Acapulco [Mexico] viciniis." This is most certainly not a Philippine species. The note given above under *Bauhinia lunularia* Cav. applies here.

NEPTUNIA OLERACEA Lour.; F.-Vill. Novis. App. (1880) 58, as Philippine by citation of *Cuming 2352;* this specimen was from Malacca. The reference is now hardly worthy of exclusion, as the species has very recently been collected in Mindanao.

EUPHORBIACEAE

SEBASTIANA CHAMAELEA Muell. Arg. in DC. Prodr. 15 ^{2} (1866) 1175. "In Philippinis (Cuming 2324)." The specimen was from Malacca. No representative of the genus is known from the Philippines. Unimportant is the reference to *Cuming 2407*, under *Sauropus albicans*, and *Cuming 2429*, under *Euphorbia atoto* Forst., by Mueller and by Boissier l. cc. 241, 12; both specimens were from Malacca, not from the Philippines, but both species occur in the Philippines.

SIMARUBACEAE

EURYCOMA LONGIFOLIA Jack; Vidal Rev. Pl. Vasc. Filip. (1886) 78. The Philippine record was based on a specimen collected by Lobb, labeled "Luzon." It can safely be excluded, as no representative of the genus is known from the Philippines; *E. dubia* Elm. probably does not even belong in the *Simarubaceae*. Lobb's specimen was probably from Singapore or Borneo, where the species is common.

ANACARDIACEAE

MANGIFERA LAGENIFERA Griff.; Perk. Frag. Fl. Philip. (1904) 25. "Philippines (Cuming 2330);" the specimen was from Malacca, not from the Philippines; *Merrill 610* referred here by Dr. Perkins is *Buchanania arborea* Bl. *Mangifera lagenifera* Griff. does not occur in the Philippines.

AQUIFOLIACEAE

ILEX LOBBIANA Rolfe in Journ. Linn. Soc. Bot. 21 (1884) 309. This was based on a specimen collected by Lobb and labeled "Luzon." The species has not appeared in our recent collections and in all probability Lobb's specimen was not from Luzon, but from Java; this is confirmed by Loesener's recent treatment of *I. lobbiana*, who considers it merely as a variety of the Javan *Ilex triflora* Blume. At any rate, *Ilex lobbiana* Rolfe can safely be excluded from the Philippine list.

THEACEAE

ARCHYTAEA VAHLII Choisy = *A. alternifolia* (Vahl) Hochr. This was admitted by F.-Villar, Novis. App. (1880) 19, as Philippine, who erroneously reduced to it *Helianthemum triflorum* Blanco; Blanco's species is *Grewia stylocarpa* Warb. Vidal [Rev. Pl. Vasc. Filip. (1886) 58] admitted *Archytaea vahlii* as Philippine on the basis of a specimen collected by Lobb,

labeled "Luzon." No representative of the genus has been found in the Philippines, and Lobb's specimen was probably from Singapore or Borneo, where the species is common.

VIOLACEAE

IONIDIUM THYMIFOLIUM Presl Rel. Haenk. 2 (1835) 97 "Habitat in insula Luzon." No representative of the genus is known from the Philippines. Presl himself later (Bot. Bemerk. 11) credits *I. thymifolium* to the Cape of Good Hope.

VIOLA PHILIPPICA Cav. Ic. 6 (1801) 19, *t. 529, f. 2.* "Habitat in Insula Luzon tertio a Manila lapide, ibique *Oxalis sensitiva; Morinda axillaris; Iusticia nasuta; Mogorium sambac; Scirpus dipsaceus, barbatus, miliaceus,* et *dichotomus.*" This was certainly very definitely localized by Cavanilles, yet there is every reason to believe that *Viola philippica* was not from the Philippines, but probably from South America, Mexico, or California. The indigenous species of *Viola* in the Philippines are all from high altitudes, and none of them approach the species figured and described by Cavanilles; none occur within many miles of Manila except the cultivated *Viola odorata* L.

RHIZOPHORACEAE

ANISOPHYLLEA DISTICHA Hook.; Rolfe in Journ. Bot. 23 (1885) 212. This was admitted as Philippine on the basis of a Lobb specimen labeled "Luzon." No representative of the genus is known from the Philippines, and *A. disticha* can safely be eliminated from the Philippine list. Lobb's specimen was probably from Singapore or Borneo, where the species is common.

MYRTACEAE

BAECKEA FRUTESCENS Linn.; F.-Vill. Novis. App. (1880) 82. "Philipp. (Cuming)." The genus has no representative in the Philippines. The Cuming specimen mentioned by F.-Villar is *Cuming 2269,* and is from Malacca. It is correctly localized by Schauer in his description of *Baeckea cumingeana* (sic!), which was based on this collection (Walp. Ann. 2: 920).

RHODAMNIA TRINERVIA Blume; Duthie in Hook. f. Fl. Brit. Ind 2 (1878) 468. The Philippine record is based on a Cuming specimen from Malacca; no representative of the genus is known from the Philippines.

EPACRIDACEAE

LEUCOPOGON MALAYANUS Jack; Vidal Rev. Pl. Vasc. Filip. (1886) 173. This was admitted as Philippine on the basis of a specimen collected by Lobb and labeled "Luzon," with the qualifying statement by Vidal: "Como se ha indicado ya, las localidades de las plantas de Lobb no merecen entera confianza, así toda especie con solo ejemplares de ese colector queda algo dudosa para nuestra flora." The species can with safety be excluded from the Philippine flora, as it has not appeared in our comprehensive collections. Lobb's specimens were probably from Borneo, Singapore, or Java.

MELASTOMATACEAE

MARUMIA ZEYLANICA Blume; C. B. Clarke in Hook. f. Fl. Brit. Ind. 2 (1870) 542 credits this species to the Philippines, citing no specimen, but *Cuming 2383* in the Kew Herbarium under a Philippine label, accounts for

the Philippine distribution; the specimen was from Malacca. The genus has no known representative in the Philippines.

ANPLECTRUM DIVARICATUM Triana; C. B. Clarke, l. c. 546, as "Philippines;" a case similar to the preceding. The specimen in the Kew herbarium is *Cuming 2259*, from Malacca, not from the Philippines. The species does not extend to the Philippines.

KIBESSIA SIMPLEX Korth.; C. B. Clarke l. c. 552, as "Philippines," but like the two preceding cases, the Cuming specimen, so labeled, was from Malacca, not from the Philippines. The genus has no known representative in the Philippines.

MEMECYLON MANILLANUM Naud. in Ann. Sci. Nat. III 18 (1852) 276. This was based on *Cuming 2322*, under the assumption that this specimen was from the Philippines, and apparently from some point near Manila. The specimen, however, was from Malacca, not from the Philippines. It is a synonym of *M. caeruleum* Jack, and here must also be reduced *M. diversifolium* Presl. [See Merrill in Philip. Journ. Sci. 8 (1913) Bot. 227.]

PTERNANDRA CAERULASCENS Jack; Triana in Trans. Linn. Soc. 28 (1871) 153. "Cuming 2316," but the specimen was from Malacca, not from the Philippines. The genus has no representative in the Philippines.

ALLOMORPHIA EXIGUA Blume; Triana l. c. 74. "Cuming 2295;" the specimen was from Malacca, not from the Philippines. No representative of the genus is known from the Philippines.

DISSOCHAETA PEPERICARPA Naud. in Ann. Sci. Nat. III 15 (1851) 71, based on *Cuming 2259* as the type, from the Philippines. The specimen was from Malacca, not from the Philippines. The species does not extend to the Philippines.

SONERILA HETEROSTEMON Naud. in Ann. Sci. Nat. III 15 (1851) 326, based on *Cuming 2349* from "Luzon" = *Sonerila obliqua* Korth.; Triana in Trans. Linn. Soc. 28 (1871) 77, with the citation of the same locality and number. *Cuming 2349* was from Malacca, not from the Philippines; the species does not occur in the Philippines.

MYRSINACEAE

EMBELIA MYRTILLUS Kurz; Rolfe in Journ. Bot. 23 (1885) 213. This Philippine record was based on a specimen collected by Lobb and labeled "Luzon;" it has not appeared in our collections and can safely be eliminated from the Philippine flora. Lobb's specimen was probably from Singapore or Borneo.

EMBELIA RIBES Burm.; A. DC. in DC. Prodr. 8 (1844) 85. "in Philippinis (Cuming! 2320)." The specimen was from Malacca; the species is quite unknown as Philippine.

MAESA RAMENTACEA Wall.; A. DC. l. c. 77. "Philippinis (Cuming! 2286)." The specimen was from Malacca; the species does not occur in the Philippines.

LOGANIACEAE

FAGRAEA LIGUSTRINA Blume; Vidal Rev. Pl. Vasc. Filip. (1886) 191. The Philippine record was based on a specimen collected by Lobb and labeled "Luzon;" the species is otherwise unknown as Philippine and can safely be excluded. Lobb's specimen was probably from Java.

CONVOLVULACEAE

CONVOLVULUS SPHAEROSTIGMA Cav. Ic. 5 (1799) 54, *t. 481.* "Habitat in Mindanao * * * et * * * in Regni Mexicani." I believe that Choisy [DC. Prodr. 9 (1845) 397] is correct in reducing this to the South American *Jacquemontia hirsuta* Choisy, although if so, Cavanilles's specific name is the older. There is very little probability that the Mindanao record is correct.

VERBENACEAE

CLERODENDRON VILLOSUM Blume; Schauer in DC. Prodr. 11 (1847) 667. "In Philippinis (Cuming! 2415)." The specimen was from Malacca, not from the Philippines. The species, however, seems to be well represented in recent collections from the southern Philippines.

SOLANACEAE

SOLANUM INDICUM Linn.; Dunal in DC. Prodr. 13[1] (1852) 309. "Ins. Philippines (Cuming 2261)." The specimen was from Malacca, not from the Philippines. The species is unknown from the Archipelago.

SOLANUM TRILOBATUM Linn.; Dunal l. c. 287. "In insulis Philippinis (Cuming, pl. exs. n. 2342)." The specimen was from Malacca. The species is not known from the Philippines.

GESNERIACEAE

DIDYMOCARPUS MARGINATA C. B. Clarke in DC. Monog. Phan. 5 (1883) 96 "Malacca (Lobb, n. 184 in h. Kew). Ins. Philippinicae; Luzon ? (Lobb, in h. Kew, habitatio autem dubia)." Nothing resembling this species has been found in the Philippines, so it is probable that Lobb's specimen labeled "Luzon" probably did not originate in the Philippines. See King & Gamble in Journ. As. Soc. Beng. 74[2] (1908) 755 who quote Ridley: "I took this [*D. ophirensis* Ridl.] at first to be *D. marginata* Clarke * * * which was based on a plant collected in Malacca or Luzon by Lobb, but which, from the description, may be a form of *D. reptans*, and the locality of which is doubtful." *Didymocarpus reptans* is widely distributed in the Malay Peninsula.

OREOCHARIS ? NOTHA C. B. Clarke in DC. Monog. Phan. 5 (1883) 64 "Manille ? (Barthe in h. Paris)." Barthe's specimen was probably from southern China, not from the Philippines. No representative of the genus has been found in the Archipelago.

ACANTHACEAE

ERANTHEMUM CRENULATUM Wall.; Nees in DC. Prodr. 11 (1847) 454. *Cuming 1658* was from the Island of Panay, Philippines, but *Cuming 2357* was from Malacca, not from the Philippines. Under the variety *angustifolium* Nees l. c. 454, *Cuming 2389* was from Malacca, not from the Philippines.

PLANTAGINACEAE

PLANTAGO PHILIPPICA Cav. Ic. 4 (1797) 35, *t. 359, f. 2.* "Habitat in Santa Cruz de la Laguna in Philippicis insulis." This is most certainly not a Philippine species. The genus is represented in the Archipelago only by an introduced form of *Plantago major* Linn. Nee's specimen, on which the species was based, was probably from some part of America.

RUBIACEAE

CINCHONA PHILIPPICA Cav. Ic. 4 (1797) 15, *t. 329*. "Habitat prope Manila in Santa Cruz de la Laguna." Cavanilles's species is the basis of *Exostemma philippicum* R. & S.=*Badusa philippica* Vid. No Philippine rubiaceous plant has appeared in our collections that at all approaches the form figured and described by Cavanilles. There is every reason to believe that Nee's specimen did not originate in the Philippines, but that it came from tropical America, Polynesia, or perhaps Australia.

COMPOSITAE

PHARETRANTHUS (gen. nov.) Klatt in Flora **68** (1885) 203 was probably based on a Cuming St. Helena specimen although credited to the Philippines. Hoffmann in Engl. & Prantl Nat. Pflanzenfam. 4[5] (1889) 243 under *Coreopsis* states: "Vielleicht gehört auch die homogame, strauchige Gattung *Pharetranthus* Klatt auf den Philippinen hierher," but in the Nachträge pp. 325, 326 *Pharetranthus* is reduced to *Pterobium*, a genus confined to St. Helena.

The total number of species excluded from the Philippine flora that have been credited to the Archipelago on erroneous identifications, and by the citation of wrongly labeled herbarium material, approximates 2,500 species. About 75 of these can be accounted for through erroneously or imperfectly labeled herbarium specimens, but most of the species have been admitted as Philippine through misinterpretation of descriptions.

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NEW SPECIES OF SCHEFFLERA

By E. D. MERRILL[1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The increase in the number of known species of this genus in the Philippines has been rather remarkable. Up to the close of the past century but three species were definitely known from the Archipelago. As in a number of our large genera of phanerogams most of the species of *Schefflera* are endemic, and most of them are of very local occurrence in the Philippines, few, such as *Schefflera odorata* and *S. insularum* being of general distribution in the Archipelago. The present paper consists of the descriptions of twelve presumably new species of *Schefflera,* bringing the total number of Philippine forms up to approximately fifty-five, of which five are in the section *Cephaloschefflera,* which is perhaps entirely worthy of generic rank, the remainder belonging in the section *Euschefflera, Heptapleurum.*

SCHEFFLERA CRASSISSIMA sp. nov. § *Cephaloschefflera.*

Arbor vel frutex ut videtur epiphyticus, glaber; foliis palmatim 8-foliolatis, foliolis crassissime coriaceis, ellipticis vel oblongo-ellipticis, nitidis, in siccitate brunneis, integris, usque ad 15 cm longis, breviter abrupte acuminatis, basi late rotundatis vel subcordatis, nervis utrinque circiter 10, reticulis primariis laxis, secundariis obsoletis; petiolo crasso, circiter 25 cm longo; racemis crassis, 30 ad 40 cm longis, capitulis sub fructu ellipsoideis, 1.5 cm longis, densis, fructibus 5-locellatis.

A shrub or tree, quite glabrous (flowers unknown), apparently epiphytic. Petioles stout, cylindric, dark-brown when dry, about 1 cm in diameter and 25 cm long. Leaflets 8, elliptic to oblong-elliptic, very thickly coriaceous, brownish and shining when dry, of about the same color on both surfaces, 12 to 15 cm long, about 7 cm wide, entire, margins revolute, apex very shortly and abruptly acuminate, base broadly rounded to subcordate; lateral nerves about 10 on each side of the midrib, slender, anas-

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tomosing, the primary reticulations very lax, the secondary ones obsolete; petiolules stout, dark-brown when dry, 8 cm long. Racemes apparently axillary, stout, 30 to 40 cm long, the rachis dark-brown when dry, 7 to 10 mm in diameter. Heads mostly in the upper one-half, their pedicels stout, 1.5 to 2 cm long, the rachis with rather numerous scars of fallen pedicels; fruiting heads ellipsoid, 1.5 cm long, dense, the individual fruits about 4 mm long, about 3.5 mm in diameter, prominently 5-angled, 5-celled, crowned by the depressed-globose, 5-sulcate stigma.

LUZON, Province of Tayabas, Mount Pular, *Bur. Sci. 19379 Ramos*, January 15, 1913, altitude about 900 meters, on trees.

Among the Philippine species nearest to *Schefflera oblongifolia* Merr., but with relatively shorter and broader leaflets which are fewer nerved, and with smaller heads. The leaflets are unusually thickly coriaceous.

SCHEFFLERA AGAMAE sp. nov. § *Euschefflera, Heptapleurum.*

Arbor glabra, circiter 10 m alta; foliis palmatim 7-foliolatis, foliolis oblongo-ellipticis vel elliptico-ovatis, chartaceis, usque ad 15 cm longis, nitidis, breviter abrupte acute acuminatis, basi subacutis, nervis utrinque circiter 5, distantibus, distinctis, inferioribus adscendentibus, reticulis laxis; inflorescentiis terminalibus, ramis primariis paucis, elongatis, usque ad 40 cm longis, ad apicem ramulorum fasciculatis; fructibus ellipsoideis vel ovoideis, 4 ad 5 mm longis, leviter sulcatis, umbellatis, umbellis breviter pedicellatis, in ramis primariis racemose dispositis.

A glabrous tree about 10 m high, the branches terete, wrinkled when dry, pale grayish-brown, about 8 mm in diameter. Leaves palmately 7-foliolate, the petioles about 9 cm long, base inflated, the stipular part broadly ovate, brown, 1 cm long, coriaceous, clasping the stem. Leaflets chartaceous, oblong-elliptic to elliptic-ovate, somewhat shining, the lower surface slightly paler than the upper, 11 to 15 cm long, 6 to 7 cm wide, entire, apex abruptly acutely acuminate, base subacute; lateral nerves about 5 on each side of the midrib, distant, rather distinct, the basal ones usually ascending, the reticulations lax; petiolules 1 to 3 cm long. Branchlets extended above the uppermost leaf and bearing several brown, coriaceous, broadly ovate, more or less keeled, sometimes retuse bracts 1 to 2.5 cm long, similar to the stipules, distant or somewhat imbricate. Branches of the inflorescence fascicled at the tips of the branchlets, few, elongated, quite glabrous, up to 40 cm in length, dark-brown when dry. Fruits ovoid or ellipsoid, 4 to 5 mm long, when dry somewhat sulcate, 5-celled, umbellately disposed, 3 to 7 in each umbel, their pedicels 2 to 3 mm long, the peduncles of the umbels 3 to 6 mm long;

umbels numerous, racemosely disposed throughout the entire length of the branches except for the lower 5 to 6 cm.

PALAWAN, Alfonso III, *For. Bur. 21603 Agama*, May 11, 1914, on rocky hills, altitude about 30 meters, the fruit yellow when fresh.

The specimens were distributed under the name *Schefflera palawanensis* Merr., but the species is not at all closely allied to the form described under this name. It is perhaps as closely allied to the Malayan *Heptapleurum subulatum* Miq. as any other species but differs in very many characters, notably in its entirely glabrous inflorescence.

SCHEFFLERA BANAHAENSIS sp. nov. § *Euschefflera, Heptapleurum.*

Frutex (?) erectus, glaber; foliis longe petiolatis, palmatim 6-foliolatis, foliolis oblongo-ellipticis, usque ad 11 cm longis, utrinque subaequaliter angustatis, basi acutis, apice breviter obtuse acuminatis, in siccitate supra atro-olivaceis, leviter nitidis, nervis utrinque 8 ad 10, tenuibus, obscuris, reticulis obsoletis vel subobsoletis; paniculis terminalibus, amplis, laxis, ramis patulis, primariis usque ad 17 cm longis; floribus 6-meris, umbellatis, umbellis in ramis primariis racemose dispositis; fructibus in siccitate leviter sulcatis, ovoideis, circiter 3 mm longis, 6-locellatis.

Apparently an erect shrub, quite glabrous, the ultimate branches brown, wrinkled, terete, about 5 mm in diameter. Leaves palmately 6-foliolate, their petioles about 12 cm long, dark reddish-brown when dry; leaflets oblong-elliptic, coriaceous, 8 to 11 cm long, 2.5 to 4.5 cm wide, subequally narrowed to the acute base and to the shortly blunt-acuminate apex, the upper surface when dry black-olivaceous, shining, the lower paler, brownish or fuliginous; lateral nerves very slender, obscure, 8 to 10 on each side of the midrib, the reticulations obsolete or nearly so; petiolules 3 to 4 cm long. Panicles terminal, the rachis, in fruit, about 10 cm long, the primary branches racemosely disposed, alternate, the lower ones up to 17 cm long, the upper ones somewhat shorter, each subtended by a thickly coriaceous, ovate, deciduous, obtuse bract about 5 mm long. Flowers umbellate, the umbels racemosely arranged on the primary branches, in fruit the peduncles 7 to 10 mm long, each bearing about 6 fruits, the pedicels often nearly as long as the peduncles. Fruits ovoid, about 3 mm long, when dry obscurely longitudinally sulcate, 6-celled, 6-seeded.

LUZON, Province of Tayabas, Lucban (Mount Banajao), *Bur. Sci. 19522 Ramos*, January 29, 1913, along streams, the fruits yellow.

In the same group with and closely allied to *Schefflera luzoniensis* Merr., differing in its larger leaflets which are but slightly shining and not at all caudate-acuminate, and its glabrous, very much larger, lax panicles.

SCHEFFLERA BENGUETENSIS sp. nov. § *Euschefflera, Heptapleurum.*

Frutex erectus, 3 ad 5 m altus, partibus junioribus inflorescentiisque plus minusve pallide villosus; foliis palmatim 7- ad 11-foliolatis, foliolis subcoriaceis, integris, oblongis ad anguste oblongo-obovatis, acuminatis, basi acutis, junioribus subtus plus minusve stellato-villosis, usque ad 10 cm longis, nervis primariis utrinque circiter 10, cum secundariis plus minusve confusis; paniculis terminalibus, circiter 20 cm longis, ramis primariis 5 ad 9, elongatis; floribus 5-meris, umbellatis, umbellis racemose dispositis.

An erect shrub, the younger parts and the inflorescence more or less pale-villous, the indumentum sometimes somewhat stellate, in age the plant often becoming nearly glabrous. Branches terete, pale-gray, 4 to 8 mm in diameter, more or less wrinkled when dry. Leaves palmately 7- to 9-foliolate, the petioles 5 to 9 cm long, base inflated and clasping the stems; leaflets oblong to narrowly oblong-obovate, subcoriaceous, olivaceous or brownish-olivaceous when dry, 6 to 10 cm long, 2 to 4 cm wide, entire, the apex distinctly acuminate but not at all caudate, base acute, in age quite glabrous, the younger leaves more or less stellate-villous with nearly white hairs on the lower surface; primary lateral nerves about 10 on each side of the midrib, slender, not prominent, often scarcely more distinct than are the secondary nerves and the primary reticulations; petiolules 1.5 to 4 cm long. Panicles terminal, in anthesis rather densely villous with pale hairs, in fruit often nearly glabrous, the rachis up to 9 cm in length, with from 5 to 9, alternate, spreading or ascending branches 8 to 20 cm in length, each branch subtended by an oblong-ovate, coriaceous, densely villous, deciduous bract about 8 mm in length. Flowers in racemosely arranged umbels, greenish, 5 to 12 flowers in each umbel, 5-merous, the pedicels 2 to 4 mm long, the peduncles of the umbels 4 to 10 mm long. Petals 5, triangular-ovate, acute, 3-nerved, about 2 mm long. Filaments slender, 3 to 3.5 mm long; anthers small, broadly ellipsoid. Ovary 5-celled. Fruit bright yellow when mature, fleshy, when dry prominently 5-sulcate, about 3 mm in diameter, globose-ovoid, 5-celled.

LUZON, Subprovince of Benguet, Baguio and vicinity, *Elmer 6311* (type) *4626, 5973, Phil. Pl. 1778 Merrill, Williams 1164, 1163, Bur. Sci. 2815, 3424, 3503, 3370 Mearns, For. Bur. 21848 Leaño;* Mount Pulog, *For. Bur. 16331 Curran, Merritt, & Zschokke:* Subprovince of Bontoc, Bauco, *Vanoverbergh 592*, in flower April and May, in fruit in July.

This species is manifestly allied to *Schefflera caudata* Merr. & Rolfe (*S. acuminatissima* Merr.), with which it has been confused. It differs

constantly in its smaller leaves which are not at all caudate-acuminate. It grows in dense damp thickets in limestone regions, reaching an altitude of at least 1,600 meters.

SCHEFFLERA CURRANII sp. nov. § *Euschefflera, Heptapleurum.*

Arbor glabra circiter 7 m alta; foliis palmatim 7-foliolatis, foliolis chartaceis, oblongis vel anguste oblongis, integris, utrinque angustatis, apice acuminatis, basi acutis, usque ad 9 cm longis, nervis utrinque 7 vel 8, obscuris, reticulis laxis; inflorescentiis terminalibus, ramis primariis paucis, ad apicum ramulorum fasciculatis, usque ad 14 cm longis; fructibus 4 mm longis, sulcatis, 5-locellatis, umbellatis, umbellis in ramis primariis racemose dispositis.

A glabrous tree about 7 m high, the branches pale-brownish, terete, wrinkled, 2 to 3 mm in diameter. Leaves palmately 7-foliolate, the petioles slender, about 9 cm long, base inflated and clasping the stems. Leaflets oblong to narrowly oblong, chartaceous, olivaceous when dry, dull, and of about the same color on both surfaces, entire, subequally narrowed to the acute base and to the sharply acuminate apex, the acumen short, 5 to 9 cm long, 2 to 2.5 cm wide; lateral nerves 7 or 8 on each side of the midrib, slender, not prominent, anastomosing, the reticulations lax; petiolules 1.5 to 3 cm long. Inflorescence terminal, the rachis not at all produced, consisting of 3 or 4 primary branches up to 14 cm in length which are fascicled at the apices of the branchlets. Fruits umbellate, about 4 mm long, prominently sulcate when dry, 5-celled, ovoid in outline, the umbels racemosely disposed on the primary branches, each with from 3 to 5 fruits, the pedicels 3 mm long or less, the peduncles not exceeding 4 mm in length. The uppermost fruits on some branches are merely fascicled instead of umbellate.

PALAWAN, Victoria Peak, *For. Bur. 3853 Curran*, March 24, 1906, on rocky river banks, altitude about 1,200 meters

This species has been placed in the herbarium of the Bureau of Science with *Schefflera caudata* Merr. & Rolfe, but not so named. It somewhat resembles that species, but has quite different, smaller leaflets which are not at all caudate, and is, moreover, at once separated from that species by the fact that the rachis of the inflorescence is not all elongated, the primary branches being fascicled at the tips of the branchlets.

SCHEFFLERA DIVARICATA sp. nov. § *Euschefflera, Heptapleurum.*

Frutex ut videtur scandens, glaber; foliis palmatim 4- ad 6-foliolatis, foliolis oblongis, obtusis, 5 ad 7 cm longis, integris, exterioribus distincte inaequilateralibus; inflorescentiis usque ad 25 cm longis, divaricatis, ramulis primariis circiter 4, ad apicem

ramulorum fasciculatis; ramulis secundariis paucis, patulis, 5 ad 6 cm longis; floribus paucis, in ramulis secundariis umbellatis, longe pedicellatis, 6-meris, petalis sub anthesin reflexis.

A shrub, quite glabrous, apparently scandent. Branches terete, wrinkled when dry, brownish, about 5 mm in diameter. Leaves palmately 4- to 6-foliolate, the petioles 5 to 7 cm long, base inflated and clasping the stems; leaflets oblong or narrowly oblong, coriaceous, 5 to 7 cm long, 1.5 to 2 cm wide, brown when dry, obtuse, base acute, margins entire, the lateral leaflets distinctly inequilateral, sometimes even slightly falcate; lateral nerves about 4 on each side of the midrib, not prominent, distant, the reticulations very lax, obscure; petiolules 5 to 10 mm long. Inflorescence terminal, of about 4 primary branches fascicled at the tip of each branchlet, up to 25 cm long, the peduncular parts of each primary branch about 15 cm long; secondary branches few, spreading, up to 6 cm long, each bearing at its apex a 5- or 6-flowered umbel, the pedicels about 2 cm long. Flowers 6-merous. Calyx disk-like, about 3 mm in diameter. Petals 6, ovate or oblong-ovate, acute, reflexed after anthesis, about 3.5 mm long, 2 mm wide. Filaments 2 to 2.5 mm long, slender; anthers about 2 mm long. Ovary very shallow, 6-celled, the top distinctly wrinkled when dry, the style less than 1 mm long, sulcate.

BASILAN, Comalarang, *Bur. Sci. 16132 Reillo*, August 31, 1912, in forests, flowers yellow.

A very strongly marked species entirely different from all forms known to me. It is characterized by its small, narrow, obtuse leaflets, the lateral ones being distinctly inequilateral, and its relatively very long, more or less divaricate few-flowered inflorescence, its few-flowered long-peduncled umbels, and its long pedicelled flowers.

SCHEFFLERA EUCAUDATA sp. nov. § *Euschefflera, Heptapleurum.*

Frutex, ut videtur scandens, ramulis junioribus inflorescentiisque minute pallide furfuraceis exceptis glaber; foliis palmatim 7-foliolatis, foliolis chartaceis, integris, oblongis, usque ad 20 cm longis, basi acutis, apice tenuiter acute subcaudato-acuminatis, nervis primariis utrinque circiter 15, patulis, subtus prominentibus; floribus 5-meris, umbellatis, umbellis numerosis, densis, globosis, in ramulis racemose dispositis, ramulis circiter 4, usque ad 25 cm longis, ad apicem ramulorum fasciculatis.

A shrub, apparently scandent, glabrous except the tips of the branchlets and the furfuraceous inflorescence. Branches terete, grayish-brown when dry, prominently wrinkled, about 5 mm in diameter. Leaves 7-foliolate, the petioles about 18 cm long, the stipule intrapetiolar, thickly coriaceous, oblong, somewhat

2-keeled, about 3 cm long, clasping the stem. Leaflets pale when dry, of the same color on both surfaces, somewhat shining, oblong, 15 to 20 cm long, 5.5 to 6.5 cm wide, narrowed to the acute base and to the slender, sharply subcaudate-acuminate apex, chartaceous, entire; primary lateral nerves about 15 on each side of the midrib, prominent, spreading, anastomosing, the secondary nerves and reticulations distinct; petiolules 3 to 5 cm long. Flowers small, umbellate, the umbels racemosely arranged, the racemes about 4, fascicled at the tips of the branchlets, the rachis not at all elongated between the racemes, the inflorescence subtended by several lanceolate, coriaceous, acuminate, furfuraceous bracts about 4 cm in length, the inflorescence rather uniformly pale-furfuraceous, the branches up to 25 cm in length. Umbels very numerous, globose, dense, in mature bud up to 10 mm in diameter, mostly 15- to 20-flowered, their peduncles about 6 mm long, each subtended by a narrowly lanceolate, acuminate bract about 1 cm in length. Flowers 5-merous, their pedicels about 2 mm long. Calyx minutely pubescent, about 1.5 mm in diameter, obscurely 5-toothed. Petals 5, ovate, 2 mm long, 1 mm wide, acute, with three prominent brownish nerves; filaments 1.2 mm long; anthers broadly elliptic, 1 mm long. Ovary 5-celled.

BASILAN, Comalarang, *Bur. Sci. 16108 Reillo,* August 31, 1912, in forests, flowers yellow.

A species well characterized by its slenderly and acutely acuminate, entire leaflets, its fascicled primary branches of the inflorescence, and its dense, globose umbels of small 5-merous flowers. In aspect it somewhat resembles *Schefflera demesae* Merr. of Mindanao, but that species has its flowers in fascicles, not in umbels.

SCHEFFLERA GLABRA sp. nov. § *Euschefflera, Heptapleurum.*

Arbor glaberrima, circiter 10 m alta; foliis palmatim 5-foliolatis, foliolis coriaceis, integris, oblongis ad oblongo-ovatis, usque ad 8 cm longis, subcaudato-acuminatis, basi rotundatis, nervis utrinque 7 ad 11, subdistinctis; paniculis terminalibus, ramis primariis racemose dispositis, usque ad 10 cm longis; fructibus 4-locellatis, subglobosis, circiter 3 mm diametro, umbellatim dispositis, umbellis in ramis primariis racemose dispositis, pauciforis, longe pedunculatis.

A glabrous tree about 10 m high, the branches terete, pale grayish-brown when dry, wrinkled, 3 to 4 mm in diameter. Leaves palmately 5-foliolate, the petioles about 4 cm long, base inflated and clasping the stems; leaflets coriaceous, shining, oblong to oblong-ovate, entire, 4 to 8 cm long, 2 to 3.5 cm wide, base rounded, apex slenderly subcaudate-acuminate, the acumen

up to 1.5 cm long; lateral nerves rather distinct on the lower surface, 7 to 11 on each side of the midrib, somewhat confused with the secondary nerves, the reticulations distinct; petiolules 6 to 15 mm long. Panicles terminal, the rachis slender, about 3 cm long, the branches alternate, racemosely arranged, rather few, the lower ones up to 12 cm long. Fruits umbellately arranged, subglobose, about 3 mm in diameter, more or less sulcate, nearly black when dry, 4-celled, the pedicels slender, 4 to 5 mm long, the umbels racemosely disposed on the primary branches, scattered, their peduncles slender, 1 to 1.5 cm long.

LUZON, Benguet Subprovince, Imogen-Nozo trail, *For. Bur. 14195 Merritt*, December 22, 1908, in hardwood forests, altitude about 1,500 meters.

A species well characterized by its 5-foliolate leaves, shining, entire, subcaudate-acuminate leaflets, lax, entirely glabrous panicles, few-flowered, slenderly peduncled umbels, and 4-celled fruits.

SCHEFFLERA MAGREGORII sp. nov. § *Euschefflera, Heptapleurum.*

Arbor circiter 10 m alta, glabra; foliis palmatim 5- vel 6-foliolatis, foliolis crasse coriaceis, integris, acuminatis, basi acutis, oblongis, usque ad 10 cm longis, nervis lateralibus obscuris, utrinque circiter 10; paniculis terminalibus, glabris, pyramidatis, circiter 20 cm longis, ramulis primariis racemosis; floribus 5-meris, umbellatis, umbellis in ramulis primariis racemose dispositis; fructibus subglobosis, circiter 3 mm diametro, vix sulcatis, 5-locellatis.

A tree about 10 m high, entirely glabrous. Branches terete, grayish-brown, the ultimate ones about 5 mm in diameter. Leaves palmately 5- or 6-foliolate, the petioles dark reddish-brown when dry, about 10 cm long; base dilated and somewhat clasping the stem; leaflets oblong, thickly coriaceous, 8 to 10 cm long, 3 to 4 cm wide, pale-olivaceous and shining when dry, of the same color on both surfaces, entire, base acute, apex rather prominently acuminate, acumen rather stout, straight or curved, blunt; primary lateral nerves about 10 on each side of the midrib, slender, not prominent, scarcely more distinct than the secondary nerves; petiolules 1.5 to 3 cm long. Panicles terminal, pyramidal, about 20 cm long, the branches few, alternate, spreading, the lower ones up to 10 cm long. Flowers 5-merous, the umbels usually with from 4 to 6 flowers, racemosely disposed on the primary branches, alternate, their peduncles 5 to 6 mm long, the pedicels about 3 mm long. Fruit blackish when mature, globose, about 3 mm in diameter, when dry scarcely or obscurely sulcate, 5-celled, 1- to 3-seeded.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19839 McGregor*, February 2, 1913, altitude not indicated, but apparently from the mossy forest.

A species similar and manifestly allied to *Schefflera binuangensis* C. B. Rob. but readily distinguished by its entirely glabrous panicles.

SCHEFFLERA MULTIFLORA sp. nov. § *Euschefflera, Heptapleurum.*

Frutex erectus ramulis junioribus inflorescentiisque plus minusve furfuraceis; foliis longe petiolatis, palmatim 6- vel 7-foliolatis, foliolis oblongis, coriaceis, usque ad 25 cm longis, acuminatis, basi acutis ad subrotundatis, margine distanter serratis, nervis utrinque circiter 7, subtus valde prominentibus, reticulis laxis; paniculis terminalibus, floribus umbellatis, umbellis numerosis, racemose dispositis, racemis usque ad 50 cm longis; fructibus ellipsoideis vel ovoideis, in siccitate valde longitudinaliter sulcatis, 6-locellatis, 4 ad 5 mm longis.

An erect shrub or small tree 4 to 6 m high, the younger parts and the inflorescence rather densely furfuraceous with brownish-cinereous indumentum. Branches apparently stout. Leaves palmately 6- or 7-foliolate, the petioles stout, 30 to 40 cm long, brownish, glabrous, about 5 mm in diameter. Leaflets oblong, coriaceous, brownish-olivaceous when dry, slightly shining, 15 to 25 cm long, 5 to 8 cm wide, apex rather abruptly acuminate, base acute, obtuse, or somewhat rounded, margins with distant, rather small, serrate or serrate-crenate teeth, the upper surface quite glabrous, the lower surface in young leaves minutely stellate-furfuraceous near the midrib, soon becoming quite glabrous; lateral nerves about 7 on each side of the midrib, very prominent on the lower surface, anastomosing, the basal pair usually ascending, the reticulations coarse, lax, prominent; petiolules of the lower (outer) leaflets 2 to 2.5 cm, of the central ones about 5 cm long. Inflorescence terminal, the rachis stout, bearing numerous stout branches up to 50 cm long, of racemosely arranged umbels, each branch subtended by a lanceolate, coriaceous, glabrous or slightly furfuraceous bract 3 to 6 cm long; umbels very numerous, their pedicels 1 to 2 cm long, each subtended by a lanceolate, acuminate bract 8 to 10 mm long, each umbel with from 15 to 25 fruits, the umbels about 2.5 cm in diameter, the pedicels 6 to 8 mm long, the fruits ellipsoid to ovoid, 4 to 5 mm long, when dry prominently longitudinally sulcate, 6-celled, 5- or 6-seeded.

MINDANAO, Bukidnon Subprovince, Sumilao, *Bur. Sci. 15776 Fénix*, August, 1912, along mountain streams, locally known as *kamang-kamang;* Mount Dilirig, *Bur. Sci. 21382 Escritor*, July 31, 1913.

A species probably as closely allied to the common *Schefflera insularum* Harms as any other species but differing notably in its inflorescence, its habit, and its very prominently reticulate leaflets.

SCHEFFLERA NITIDA sp. nov. § *Euschefflera, Heptapleurum.*

Frutex scandens, glaber; foliis palmatim 6-foliolatis, foliolis in siccitate olivaceis, valde nitidis, subcoriaceis, ellipticis vel oblongo-ellipticis, usque ad 12 cm longis, breviter obtuse acuminatis, basi subacutis, nervis utrinque circiter 5, tenuibus; inflorescentiis terminalibus, laxis, paniculatis, e basi ramosis, ramis inferioribus usque ad 25 cm longis; floribus 5- vel 6-meris, umbellatis, umbellis longe pedunculatis, in ramis primariis racemose dispositis.

A scandent entirely glabrous shrub reaching a height of 15 m and a diameter of 4 cm. Ultimate branches brown when dry, terete, striate, about 5 mm in diameter. Leaves palmately 6-foliolate, their petioles brown when dry, about 12 cm long, base enlarged and clasping the stems. Leaflets elliptic to oblong-elliptic, subcoriaceous, olivaceous when dry, the upper surface strongly shining, entire, 9 to 12 cm long, 5 to 7 cm wide, apex shortly and obtusely acuminate, base subacute; lateral nerves about 5 on each side of the midrib, slender, distant, the reticulations lax; petiolules 3 to 5 cm long. Panicles terminal, branched from the base, the rachis up to 15 cm in length, the primary branches 10 or less, the lower ones up to 25 cm in length, the upper ones shorter. Flowers white, 5- and 6-merous, umbellate, the umbels racemosely disposed on the primary branches, rather few, distant, and mostly on the upper part of the branches, their peduncles 2.5 to 4 cm long, the pedicels 5 to 10 mm long, each umbel with from 7 to 10 flowers. Calyx obconic, truncate, about 3 mm in diameter, 2.5 mm long. Petals 5 or 6, ovate or triangular-ovate, acute, about 2.5 mm long, distinctly 5-nerved, nerves brown. Filaments slender, 3 mm long; anthers broadly elliptic, about one-half as long as the filaments. Ovary 5- or 6-celled.

BASILAN, Singal, near the seashore, altitude 15 meters, *For. Bur. 18955 Miranda*, September 6, 1912, flowers with a disagreeable odor.

A species belonging in the same general group as *Schefflera odorata* Merr. & Rolfe, differing in its very lax panicles, much elongated branches, and long peduncled umbels.

SCHEFFLERA PALAWANENSIS sp. nov. § *Euschefflera, Heptapleurum.*

Frutex suberectus, 3 ad 4 m altus, inflorescentiis exceptis glaber; foliis palmatim 7- vel 8-foliolatis, foliolis subcoriaceis, integris, oblongo-ellipticis, utrinque subaequaliter angustatis, basi acutis, apice breviter acute acuminatis, usque ad 12 cm

longis, nervis utrinque circiter 6, distinctis, reticulis prominentibus; inflorescentiis terminalibus, paniculatis, ramis primariis numerosis, usque ad 12 cm longis, cinereo-pubescentibus; fructibus 3- vel 4-locellatis, 5 mm longis, umbellatis, umbellis breviter pedunculatis, in ramis primariis racemose dispositis.

A suberect shrub, apparently starting as an epiphyte, 3 to 4 m high. Branches terete, grayish-brown, wrinkled when dry, 8 to 10 mm in diameter. Leaves palmately 7- or 8-foliolate, their petioles 13 to 15 cm long, base expanded and clasping the stems; leaflets oblong-elliptic, subcoriaceous, rather pale when dry, dull, entire, subequally narrowed to the acute base and to the sharply acuminate apex, 7 to 12 cm long, 2.5 to 5.5 cm wide; lateral nerves about 6 on each side of the midrib, rather distinct, the reticulations evident on the lower surface; petiolules 2 to 5 cm long. Panicles terminal, about 12 cm long, rather uniformly cinereous-pubescent with short hairs, the rachis about 5 cm long, the branches numerous, alternate, spreading, the lower ones up to 12 cm in length. Flowers umbellate, apparently 3- and 4-merous, few in each umbel, the umbels racemosely arranged on the primary branches, short-peduncled. Fruits pale-yellow, fleshy, when dry about 5 mm long, more or less longitudinally sulcate, 3- or 4-celled, 3 to 5 in each umbel, the pedicels about 2 mm long, pubescent, the peduncles of the umbels 4 mm long or less.

PALAWAN, Taytay, in thickets bordering open grasslands at sea level, *Merrill 9221*, April 20, 1913.

Probably as closely allied to *Schefflera venulosa* Harms as to any other species, distinguished by its 3- and 4-celled fruits, its dense, pubescent panicles, short peduncles and pedicels.

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NEW SPECIES OF EUGENIA

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In Robinson's consideration of the Philippine Myrtaceae [2] ninety-eight species of *Eugenia* were recognized. The most important contribution to our knowledge of the Philippine forms, published since that date, is a paper by Elmer [3] in which thirty species of *Eugenia* are described as new, while two years later eight additional forms were described by him; [4] a very few additional forms have also been characterized by the late Dr. Robinson and by myself. In but very few cases have I been able to match Mr. Elmer's new species by material secured by other collectors, but among the numerous forms characterized by him I consider that two or three are not specifically distinct from previously described Philippine species, while *Eugenia binacag* Elm. is identical with *Eucalyptus naudiniana* F. Muell. In the present paper twenty-two additional species are described as new, bringing the total number of Philippine eugenias up to about 160. There is every reason to believe that future botanical exploration of the Archipelago will greatly increase the list, as botanical collections from little known parts of the Philippines consistently present new forms in this genus.

It is decidedly rare that truly indigenous Philippine species of *Eugenia* can be definitely referred to extra-Philippine forms, either by comparison with authentically named material or by a critical study of descriptions. With few exceptions the only species that can be matched with extra-Philippine material are those cultivated forms that are certainly not native to the Philippines, but which have been purposely introduced, such as *Eugenia malaccensis, E. jambos, E. jambolana, E. javanica,* and *E. aquea.* It is certainly to be expected that a critical comparison of Philippine types with the types of species described

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[2] Philip. Journ. Sci. 4 (1909) Bot. 331–407.
[3] Leafl. Philip. Bot. 4 (1912) 1399–1444.
[4] Ibid. 7 (1914) 2343–2358.

from that part of Malaya south of the Philippines will lead to the reduction of some of our forms, but the number of such reductions will probably be few. The herbarium of the Bureau of Science at present contains representatives of somewhat over 150 species of extra-Philippine *Eugenia*, chiefly from the Indo-Malayan region, but it is rare indeed that Philippine specimens can be matched with any of these, except as indicated above for the cultivated forms. A few of our indigenous species are widely distributed in the Archipelago, but the great bulk of them are of restricted distribution, while many are apparently of very local occurrence.

EUGENIA BLANCOI sp. nov. § *Syzygium.*

Arbor alta glabra, ramis remulisque teretibus; foliis oblongo-ellipticis, tenuiter subcaudato-acuminatis, basi acutis, coriaceis, nitidis, nervis utrinque circiter 8, distantibus, vix prominentibus; inflorescentiis paniculatis, terminalibus, 2 ad 3 cm longis, e basi ramosis, plus minusve confertis; floribus in triadibus dispositis, sessilibus, bracteolis nullis vel inconspicuis; calycibus infundibuliformibus, truncatis, circiter 5 mm longis latisque.

A tall tree, entirely glabrous, the branches and branchlets terete, grayish or brownish, smooth, the ultimate branchlets 2 mm long or less. Leaves opposite, oblong-elliptic, thickly coriaceous, rather pale-brownish when dry, shining on both surfaces, 8 to 13 cm long, 3 to 5.5 cm wide, narrowed to the acute base and to the rather slender subcaudate-acuminate apex; primary lateral nerves about 8 on each side of the midrib, distant, irregular, not prominent, anastomosing 3 to 7 mm from the margin, forming a somewhat arched marginal nerve, the reticulations very lax and faint; petioles about 4 mm long. Inflorescence terminal, paniculate, 2 to 3 cm long, branched from the base, the branches few, stout, reddish-brown, the flowers white, somewhat crowded on the ultimate branchlets. Flowers sessile, in triads on the ultimate branchlets, the bractlets none or very obscure. Calyx-tube reddish-brown when dry, funnel-shaped, about 5 mm long, 5 mm wide at the mouth, truncate, with no evidence of teeth or lobes. Petals wholly united into a calyptra about 5 mm in diameter which falls as a whole. Stamens indefinite, the filaments slender, 6 to 10 mm in length.

SAMAR, Cauayan Valley, *Bur. Sci. 17623* (type) *17492 Ramos*, March and April, 1914, on damp forested slopes.

The species is dedicated to Father M. Blanco, author of the Flora de Filipinas. It falls in the group with *Eugenia robinsonii* Elm. and *E. brittoniana* C. B. Rob., but is entirely different from these species and their allied forms in its very open leaf-venation.

EUGENIA CALCICOLA sp. nov. § *Syzygium.*

Arbor glabra circiter 8 m alta, ramis ramulisque teretibus tenuibusque; foliis oppositis, coriaceis, in siccitate pallide olivaceis, nitidis, oblongo-ellipticis, utrinque angustatis, basi acutis, apice prominente longe subrostrato-acuminatis, utrinque minute glandulosis; nervis lateralibus tenuibus, dense dispositis, primariis numerosis, quam secundariis vix magis prominentibus; inflorescentiis terminalibus et in axillis superioribus, 2 ad 3.5 cm longis; floribus sessilibus, in ramulis ultimis confertis; calycibus infundibuliformibus, 3.5 ad 4 mm longis, obscure late 4-lobatis.

A glabrous tree about 8 m high, the branches and branchlets slender, terete, somewhat brownish, the younger ones very pale-gray and 1 to 1.5 mm in diameter. Leaves opposite, pale-olivaceous when dry, of the same color on both surfaces, slightly shining, coriaceous, 3.5 to 6 cm long, 2 to 2.5 cm wide, oblong-elliptic, subequally narrowed to the acute base and to the prominently subrostrate-acuminate apex, the acumen up to 1 cm in length, 2 to 3 mm wide, blunt, both surfaces minutely glandular-punctate, the glands very numerous, more prominent on the lower than on the upper surface; petioles reddish-brown, 3 to 5 mm long. Inflorescence cymose, terminal and in the upper axils, 2 to 3.5 cm long, dark-olivaceous when dry, minutely glandular, the flowers sessile, white, crowded on the tips of the ultimate branchlets, 3 to 7 on each branchlet. Calyx funnel-shaped, 3.5 to 4 mm long, mouth about 2.5 mm in diameter, with 4, very shallow, rounded lobes. Petals entirely united, forming a calyptra about 2.5 mm in diameter. Stamens indefinite, 6 to 7 mm long; style about 8 mm long. Bractlets subtending the flowers evident, oblong-ovate, obtuse, persistent, 0.5 to 1 mm long.

LUZON, Benguet Subprovince, near Baguio, *Merrill 9746*, May 16, 1914, in thickets about limestone cliffs and boulders, altitude about 1,300 meters.

This species belongs in the group with *Eugenia perpallida* Merr. and *E. parva* Merr., but among other characters is distinguished from both by its leaves being distinctly glandular-punctate on both surfaces.

EUGENIA CAPOASENSIS sp. nov. § *Syzygium.*

Frutex 1 ad 4 m altus, glaber, ramis ramulisque teretibus; foliis oppositis, oblongo-obovatis ad late oblongo-oblanceolatis, coriaceis, nitidis, eglandulosis, usque ad 9 cm longis, apice rotundatis, obtusis vel breviter latissime obtuse acuminatis, basi angustatis, cuneatis, nervis primariis utrinque circiter 15, tenuibus, obscuris, quam secundariis vix magis prominentibus; cymis terminalibus, paucifloris, usque ad 6 cm longis, floribus

in ramulis ultimis solitariis, basi bracteolis 2 crasse coriaceis 1 mm longis persistentibus suffultis; calycis tubo 5 mm longo, truncato vel obscurissime late 4-lobato, deorsum angustato.

A shrub 1 to 4 m high, entirely glabrous, the branches and branchletes slender, terete, reddish-brown. Leaves opposite, coriaceous, oblong-obovate to broadly oblong-oblanceolate, 5 to 9 cm long, 1.5 to 3.2 cm wide, eglandular, apex rounded, obtuse, or very broadly, shortly, and obtusely acuminate, base gradually narrowed, cuneate, margins slightly recurved, shining on both surfaces, the upper surface olivaceous, the lower much paler; primary lateral nerves about 15 on each side of the midrib, slender, obscure, straight, scarcely more prominent than are the secondary nerves and the reticulations, rather densely disposed, more distinct on the upper than on the lower surface; petioles 1 to 1.5 cm long. Cymes terminal or in the uppermost axils, up to 6 cm long, few-flowered, mostly 2- or 3-branched, narrow, the flowers solitary on the ultimate branchlets, the ultimate branchlets in pairs or in threes and about 3 mm long. Bracteoles subtending the flowers thickly coriaceous, persistent, ovate, concave, obtuse, about 1 mm long. Calyx narrowly funnel-shaped, about 5 mm long, 3 mm in diameter at the apex, gradually narrowed to the base, tinged with purple when fresh, truncate or with four very broad obscure lobes. Petals and stamens white, the petals united into a calyptra about 2.7 mm in diameter. Stamens numerous.

PALAWAN, Malampaya Bay, Mount Capoas, *Merrill 9493*, April 21, 1913, forming dense thickets on exposed wind-swept ridges in the mossy forest at the summit of the mountain, altitude about 1,000 meters.

The alliance of this species is with *Eugenia densinervia* and *E. sablanansis*, but it is entirely different from both in its appearance and in its vegetative and floral characters. Its eglandular leaves at once distinguish it from *Eugenia crassibracteata* Merr.

EUGENIA CRASSIBRACTEATA sp. nov. § *Syzygium*.

Species *E. densinerviae* Merr. affinis, differt foliis multo brevioribus, oblongo-ellipticis ad oblongo-oblanceolatis, haud 7 cm longis, subtus minute glanduloso-puncticulatis.

A tree about 7 m high, entirely glabrous. Branches terete, brownish, the branchlets somewhat olivaceous or brownish, terete, or very obscurely angled. Leaves opposite, brown and shining when dry, oblong-elliptic to oblong-oblanceolate, 4 to 6 cm long, 1.5 to 2.5 cm wide, apex acute or shortly and obscurely acuminate, base acute, the margins recurved; lateral nerves numerous, very slender, primary not more distinct than the secondary ones, sometimes nearly obsolete; petioles 5 mm long

or less. Cymes terminal, peduncled, 3 to 4 cm long, rigid, rather few-flowered, branches ascending. Young fruits ellipsoid, about 7 mm long, sessile or on very short stout pedicels, each subtended by a pair of small, rigid, thick bracteoles, the bracts similar to the bracteoles but slightly larger.

LEYTE, Dagami, *Bur. Sci. 15358 Ramos*, August 13, 1912, near the summit of Mount Buraui.

A species belonging in the group with *Eugenia densinervia* Merr. and *E. sablanensis* Elm., but very different from both in its much smaller leaves which are glandular-puncticulate beneath.

EUGENIA CRASSISSIMA sp. nov. § *Syzygium?*

Arbor glabra circiter 14 m alta; foliis crassissime coriaceis, ternis, oblongo-obovatis, usque ad 25 cm longis, apice rotundatis, basi cuneatis, nervis utrinque numerosissimis, tenuibus, confertis; inflorescentiis terminalibus, pedunculatis, cymosis, circiter 15 cm diametro, bracteis bracteolisque magnis, persistentibus; calycibus urceolatis, circiter 1 cm longis, distincte 4-lobatis.

A glabrous tree about 14 m high, the branches stout, terete, brown when dry, the ultimate ones about 1 cm in diameter. Leaves verticillate, ternate, very thickly coriaceous, oblong-obovate, 18 to 25 cm long, 9 to 11 cm wide, apex broadly rounded, base narrowed, cuneate, the upper surface brown when dry, shining, the lower paler; nerves slender, very numerous, densely arranged, more distinct on the upper than on the lower surface. Inflorescence terminal, solitary, peduncled, cymose, about 15 cm in diameter, the peduncles and branches very stout, the lower branches up to 8 cm in length, the flowers crowded on the ultimate branchlets, sessile. Bracts very thickly coriaceous, persistent, oblong to ovate, up to 1 cm long, the two bracteoles subtending each flower persistent, elliptic to elliptic-obovate, 7 mm long or less, rounded, thickly coriaceous, persistent. Calyx about 1 cm long, urceolate, the lobes 4, reniform, about 4 mm wide and 2 mm long.

LEYTE, near Dagami, *Bur. Sci. 15387 Ramos*, August 22, 1912, in forests, Mount Ibuni.

A most characteristic species, entirely different from all other Philippine forms. It is easily recognized by its large, ternate, very thickly coriaceous, densely nerved leaves.

EUGENIA CAUDATIFOLIA sp. nov. § *Syzygium.*

Frutex glaber, ramis ramulisque teretibus; foliis oblongo-lanceolatis vel lanceolatis, breviter petiolatis, coriaceis, usque ad 35 cm longis, nitidis, basi rotundatis, distincte cordatis, sursum gradatim angustatis, longe tenuiter caudato-acuminatis, nervis utrinque 30 ad 35, subtus valde prominentibus; inflorescentiis

terminalibus, paniculatis, usque ad 12 cm longis, e basi ramosis; floribus sessilibus, in ramulis ultimis in triadibus dispositis; calycibus 5 ad 6 mm longis, truncatis, infundibuliformibus.

A glabrous shrub about 2 m high *fide* Wenzel, the branches and branchlets rather slender, terete, or a little compressed at the nodes, grayish- to reddish-brown, smooth, the ultimate ones 3 mm in diameter or less. Leaves opposite, oblong-lanceolate to lanceolate, 28 to 35 cm long, 7 to 8 cm wide, pale-olivaceous when dry, shining on both surfaces, base slightly narrowed, rounded, distinctly cordate, gradually narrowed from about the middle to the slenderly and sharply caudate-acuminate apex; lateral nerves 30 to 35 on each side of the midrib, spreading, slightly curved, very prominent on the lower surface, anastomosing in a marginal nerve, 3 to 5 mm from the margin, the marginal nerve as prominent as the lateral ones. Inflorescence terminal, paniculate, up to 12 cm long, many-flowered, branched from the base, the branches few. Flowers sessile, in triads on the ultimate branchlets, the subtending bracteoles broadly ovate, acute, about 1 mm long. Calyx funnel-shaped, 5 to 6 mm long, 5 mm in diameter at the throat, truncate, not at all lobed. Corolla of wholly united petals forming a calyptra 3 to 3.5 in diameter which falls as a whole. Stamens indefinite, the filaments 7 to 9 mm long.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1062* (type), August 25, 1914, in forests, altitude about 500 meters; *Bur. Sci. 15178 Ramos* from Leyte is manifestly the same species.

A very strongly characterized species, readily recognizable by its elongated, prominently nerved, cordate, slenderly caudate-acuminate leaves and its terminal paniculate inflorescences. It is most closely allied to *Eugenia urdanetensis* Elm., of Mindanao, and following Robinson's arrangement of our forms, falls in the group with *Eugenia glaucicalyx* Merr. and *E. paucivenia* C. B. Rob.

EUGENIA MARITIMA sp. nov. § *Syzygium.*

Arbor circiter 25 m alta, glabra, ramulis ramulisque tenuibus, teretibus, vel ramulis leviter compressis; foliis oppositis, coriaceis, oblongo-ellipticis, in siccitate pallidis, usque ad 10 cm longis, utrinque angustatis, basi acutis, apice subtenuiter acuminatis, nervis utrinque numerosis, tenuibus, dense dispositis; inflorescentiis lateralibus, cymosis, breviter pedunculatis, circiter 5 cm longis, calycis tubo circiter 4 mm diametro, truncato, deorsum angustato, 7 mm longo.

A glabrous tree about 25 m in height, the trunk covered with purplish or reddish-purple bark in large, thin, papery or membranaceous flakes. Branches slender, pale-brownish, terete, the

branchlets very slender, the ultimate ones about 1 mm in diameter, pale or straw-colored, usually terete, sometimes slightly compressed. Leaves opposite, pale when dry, of the same color and somewhat shining on both surfaces, oblong-elliptic, 6 to 10 cm long, 3 to 5 cm wide, subequally narrowed to the acute base and to the rather slenderly and sharply acuminate apex, minutely glandular-puncticulate on both surfaces; primary lateral nerves about 25 on each side of the midrib, slender, not prominent, scarcely more distinct than are the secondary nerves and reticulations, densely arranged; petioles about 1 cm long. Inflorescence cymose, lateral, from the branches of the second year's growth below the leaves, shortly peduncled, about 5 cm long, one or two at a node, the cymes few, branches usually three, the two lateral ones more or less spreading. Flowers white, two or three sessile at the apex of each branchlet. Calyx funnel-shaped, about 7 cm long, mouth truncate, about 4 mm in diameter, with four, broad, short, obscure lobes, the lobes 2.5 to 3 mm wide, less than 0.5 mm long. Calyptra about 5 mm in diameter. Style 1 cm long.

MINDANAO, District of Zamboanga (Olutanga Island), *For. Bur. 13670 Foxworthy, Demesa, & Villamil*, May 20, 1912 (type), in forests at the edge of the mangrove, the roots apparently extending into salt water. LUZON, Province of Camarines, Pasacao, *For. Bur. 10486 Curran*, May, 1908 (sterile), on hills near the sea.

A species belonging in the group with *Eugenia perpallida* Merr. and *E. parva* Merr., but distinguished from both, among other characters, by its lateral inflorescences.

EUGENIA NITIDISSIMA sp. nov. § *Syzygium.*

Arbor glabra circiter 10 m alta, ramis teretibus, brunneis, ramulis tenuibus, acute 4-angulatis; foliis lanceolatis, coriaceis, eglandulosis, usque ad 5 cm longis, basi acutis, apice tenuiter longe caudato-acuminatis, in siccitate pallidis vel brunneis, utrinque valde nitidis, nervis lateralibus tenuissimis, obscuris; cymis terminalibus et in axillis superioribus, usque ad 3 cm longis; calycibus in siccitate glaucescentibus, 4 ad 5 mm longis, verruculosis, breviter 5-lobatis.

A glabrous tree about 10 m high, the branches slender, terete, reddish brown, the branchlets reddish-brown, rather sharply 4-angled, very slender, mostly 1 mm in diameter or less. Leaves opposite, lanceolate, coriaceous, 3 to 5 cm long, 1 to 1.7 cm wide, usually rather pale when dry or the upper surface brownish, both surfaces strongly shining, very smooth, eglandular, base acute, apex long and slenderly caudate-acuminate, the acumen straight or slightly falcate, blunt; lateral nerves very slender,

obscure, scarcely or not at all visible to the naked eye; petioles reddish-brown, 2 to 3 mm long. Cymes terminal and in the upper axils, 1.5 to 3 cm long, the axis and branches 4-angled, pale or brownish in color. Flowers white, mostly in threes on the ultimate branchlets, each with a short pseudostalk. Calyx 4 to 5 mm long, about 1.7 mm in diameter, cylindric, narrowed below to the acute base, glaucous when dry, distinctly verruculose, the limb with 5 broadly ovate rounded teeth about 0.6 mm in length. Calyptra 2 mm in diameter. Stamens indefinite, 5 to 7 mm in length.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 922* (type), June 25, 1914. BILIRAN, *Bur. Sci. 18732 McGregor*, June, 1914. NEGROS, *For. Bur. 17342 Curran* and *For. Bur. 21969 Hinolan*, both sterile.

This very characteristic species is in the alliance with *Eugenia zeylanica* Wight, but is distinguished at once by its smaller, prominently caudate-acuminate leaves and its distinctly 4-angled branchlets. Among the Philippine species its alliance is with *Eugenia glaucicalyx* Merr., from which it is readily distinguished by the characters just indicated. It grows in forests from 300 to 700 meters in altitude. In Negros it is known as *manogobahi* and *manogobinlog*.

EUGENIA CAGAYANENSIS sp. nov. § *Syzygium*.

Arbor 7 ad 10 m alta, ramis teretibus, ramulis distincte 4-angulatis, griseis vel brunneis; foliis oblongis, coriaceis, nitidis, usque ad 6 cm longis, obtusis vel acutis, haud acuminatis, nervis lateralibus indistinctis; inflorescentiis floribusque ut in *E. nitidissimae*.

A tree 7 to 10 m high similar and closely allied to *Eugenia nitidissima*, differing especially in its leaves being obtuse or acute, not acuminate. Branches slender, reddish-brown, terete, the branchlets slender, prominently 4-angled, reddish-brown or grayish. Leaves opposite, oblong, coriaceous, shining, 3.5 to 6 cm long, 1.5 to 2 cm wide, the upper surface brown or brownish-olivaceous, shining, the lower much paler, apex acute to obtuse, not acuminate, base acute, obtuse, or even somewhat rounded; lateral nerves very slender, indistinct; petioles 2 mm long or less. Inflorescence paniculate, about 5 cm long, the rachis and branches 4-angled. Flowers in triads on the ultimate branchlets, each with a 2 mm long pseudostalk. Calyx rugose, narrowly oblong-obovoid, narrowed to the acute base, including the pseudostalk 5 to 6 mm long, the mouth about 2.5 mm in diameter, the lobes 5, somewhat reniform, rounded, about 1.8 mm wide and 1 mm long. Calyptra about 2.5 mm in diameter.

LUZON, Province of Cagayan, *For. Bur. 21875* (type) *Velasco*, May 8, 1914, in forests, altitude 300 meters, *For. Bur. 17153 Curran*, March, 1909 (sterile), in fresh water swamps at Boguey.

A species belonging in the group with *Eugenia zeylanica* Wight and very closely allied to *Eugenia nitidissima* Merr., from which it differs in its oblong, not lanceolate leaves which are obtuse or merely acute, not at all acuminate; in *Eugenia nitidissima* Merr. the leaves are lanceolate and prominently caudate-acuminate.

EUGENIA PAUCIPUNCTATA sp. nov. § *Syzygium*.

Arbor glabra, 12 ad 15 m alta, ramis ramulisque teretibus; foliis oppositis, petiolatis, coriaceis, oblongo-ellipticis, usque ad 7 cm longis, nitidis, in siccitate supra brunneis vel olivaceo-brunneis subtus pallidioribus, paucipunctatis, utrinque subaequaliter angustatis, basi acutis, apice acute subcaudato-acuminatis; nervis lateralibus tenuibus, dense dispositis, subtus distinctis, utrinque 20 ad 25; inflorescentiis terminalibus, paniculatis, 4 ad 5 cm longis, floribus sessilibus in ramulis ultimis plus minusve confertis; calycibus infundibuliformibus, circiter 4 mm longis, truncatis.

A glabrous tree 12 to 15 m high, the branches and branchlets terete, pale-brown in color, the ultimate ones 1 to 2 mm in diameter. Leaves opposite, oblong-elliptic, coriaceous, 5 to 7 cm long, 1.5 to 2.5 cm wide, brownish or olivaceous-brownish when dry, the lower surface more greenish and slightly paler, upper surface eglandular, the lower with scattered distinct glands, subequally narrowed to the acute base and to the usually caudate-acuminate apex, the acumen sharp or blunt, 1 to 1.5 cm long; lateral nerves slender but distinct on the lower surface, brownish, densely arranged, 20 to 25 on each side of the midrib, the primary ones scarcely more distinct than the secondary ones and the reticulations, anastomosing and forming a submarginal nerve about 1 mm from the edge of the leaf; petioles reddish-brown, about 7 mm long. Panicles terminal, 4 to 5 cm long, the branches rather stout, rigid, spreading. Flowers sessile and somewhat crowded in triads at the apices of the ultimate branchlets, the subtending bracteoles obsolete or very small. Calyx purple when fresh, about 4 mm long, 3 mm in diameter at the mouth, somewhat funnel-shaped, truncate, with no vestiges of teeth or lobes, the limb slightly spreading in anthesis. Calyptra about 3 mm in diameter. Stamens numerous, 4 to 6 mm long.

LUZON, Benguet Subprovince, near Baguio, *Phil. Pl. 1709 Merrill*, May 16, 1914, in thickets about limestone cliffs and boulders, altitude about 1,300 meters.

The type number of this species was distributed as *Eugenia calcicola* Merr., a species typified by *Merrill 9746* from the same locality and habitat. While somewhat resembling *Eugenia calcicola* Merr. in facies, the present species is entirely different in details, and belongs in the alliance with *Eugenia ugoensis* C. B. Rob.

EUGENIA SUBSESSILIFLORA sp. nov. § *Syzygium.*

Arbor glabra, circiter 15 m alta, ramis ramulisque teretibus; foliis oppositis, petiolatis, coriaceis, oblongo-ellipticis, acuminatis, basi acutis, usque ad 10 cm longis, haud glandulosis, nervis lateralibus tenuibus, patulis, indistinctis; floribus axillaribus terminalibusque, solitariis vel in racemis brevissimis paucifloris dispositis, subsessilibus, calycis tubo 15 ad 17 mm longo, sursum circiter 7 mm diametro, deorsum angustato; staminibus numerosis, 4 ad 10 mm longis.

A glabrous tree about 15 m high, the branches and branchlets reddish-brown, terete, the latter slender, mostly 1 to 1.5 mm in diameter. Leaves opposite, oblong-elliptic, coriaceous, rather pale-olivaceous or greenish when dry, shining, lower surface slightly paler than the upper, 6 to 10 cm long, 2.5 to 4 cm wide, subequally narrowed to the acute base and to the rather prominently acuminate apex, not at all glandular on either surface; lateral nerves very slender, spreading, indistinct, at least 20 on each side of the midrib, scarcely more distinct than the secondary nerves and reticulations; petioles 5 to 7 mm long. Flowers white, axillary and terminal, mostly solitary, rarely in very short, about 3-flowered racemes, subsessile, the pedicels, when present, not exceeding 2 mm in length. Calyx 15 to 17 mm long in anthesis, about 7 mm in diameter at the apex, gradually narrowed downward to the acute base, the limb irregularly lobed, the lobes about 3 mm long and 2 mm wide, deciduous. Calyptra about 6 mm in diameter, the interior petals orbicular-ovate, about 3 mm in diameter, apparently free. Stamens indefinite, 4 to 10 mm long. Fruit pink when fresh, 1.7 to 2 cm long, 6 to 8 mm in diameter, club-shaped, truncate, narrowed from about the middle to the acute base.

SAMAR, Ambalate, *Phil. Pl. 1679 Ramos*, April, 1914 (type), in forests. LEYTE, Buenavista near Jaro, *C. A. Wenzel 942*, July 3, 1914, in forests, altitude about 500 meters.

This species manifestly belongs in the group with *Eugenia claviflora* Roxb., but is at once distinguished by its solitary or subsolitary, nearly sessile flowers. The inflorescence and eglandular leaves distinguish it at once from *Eugenia wenzelii* Merr.

EUGENIA ALCINAE sp. nov. § *Jambosa.*

Arbor circiter 15 m alta, glabra, ramis ramulisque gracilis, teretibus; foliis ovatis ad oblongis, coriaceis, in siccitate pallidis, nitidis, utrinque minute glanduloso-puncticulatis, usque ad 7 cm longis, utrinque subaequaliter angustatis, basi acutis, apice acuminatis, nervis utrinque numerosis, tenuibus, indistinctis, dense

dispositis; cymis terminalibus et in axilis superioribus, usque ad 6 cm longis; floribus parvis, calycis tubo truncato, circiter 4 mm longo.

A tree about 15 m high, entirely glabrous, the branches and branchlets slender, terete, reddish-brown, or the branchlets pale in color. Leaves opposite, ovate to oblong-elliptic or oblong, 4 to 7 cm long, 2 to 3.5 cm wide, coriaceous, pale, of the same color, uniformly shining and glandular-puncticulate on both surfaces when dry, subequally narrowed to the acute base and to the distinctly acuminate apex, the acumen short or somewhat elongated, blunt; lateral nerves numerous, slender, indistinct, densely arranged, the primary ones about 20 on each side of the midrib, scarcely more prominent than are the secondary ones and the inter-reticulations; petioles 7 to 14 mm long. Inflorescence cymose, the cymes numerous, terminal and in the uppermost axils, up to 6 cm in length, many-flowered. Flowers mostly in pairs or in threes on the ultimate branchlets, the calyx purplish, the stamens straw-colored, the subtending bracteoles oblong-ovate, acute or obtuse, 1 mm long or less, deciduous. Calyx about 2.5 mm in diameter, truncate, including the pseudostalk about 4 mm long, cup-shaped or somewhat funnel-shaped, the pseudostalk usually about 1.5 mm long. Calyptra 1.8 mm in diameter, consisting of two separate parts, the inner part quite free from the outer and readily separating from it. Stamens numerous, the filaments 2 to 3 mm long. Style 2 mm long. Fruit when fresh globose, dark-purple, smooth, the pulp edible, somewhat mealy, with a fair flavor, when dry 5 to 7 mm in diameter.

PALAWAN, Taytay, *Merrill 9224* (type), *9316*, April 10 and May 22, 1913, the former in flower, the latter, from the same tree, in fruit, in forests and along the margins of forests, sea level to 15 meters altitude, common.

The duplicates of the specimens were probably distributed as *Eugenia saligna* C. B. Rob., but the species is entirely different from that one. Its alliance is with *Eugenia calcicola* Merr. which it greatly resembles, but from which it is at once distinguished by its smaller flowers, longer petioles, its double calyptra, much shorter stamens, and quite truncate calyx, the limb not at all lobed or toothed. Dedicated to Father F. I. Alcina, author of a very early, but as yet unpublished manuscript on the natural history of the Philippines.

EUGENIA EUPHLEBIA sp. nov. § *Jambosa.*

Arbor glabra, ramis ramulisque teretibus; foliis longe petiolatis, oblongis, coriaceis, in siccitate subolivaceis vel pallidis, nitidis, usque ad 14 cm longis, utrinque acuminatis, nervis utrinque circiter 12, supra impressis, subtus valde prominentibus;

inflorescentiis paniculatis, pyramidatis, circiter 10 cm longis latisque; floribus magnis, calycibus infundibuliformibus, lobis 4, magnis, subpersistentibus.

A glabrous tree, size not indicated by the collector, the branches and branchlets pale, terete, the latter slender, the ultimate ones 2 mm in diameter or less. Leaves opposite, oblong, coriaceous, pale or subolivaceous when dry, shining, the lower surface always pale, 9 to 13 cm long, 3 to 4.5 cm wide, subequally narrowed to the acuminate base and apex; lateral nerves about 13 on each side of the midrib, impressed on the upper surface, very prominent on the lower surface, nearly straight, rather irregular, anastomosing and forming a very prominent, slightly undulate marginal nerve on each side 2 to 4 mm from the leaf-margin; petioles 2 to 3 cm long. Panicles terminal or terminating short branches, pyramidal, about 10 cm long and wide, the branches rather few, spreading. Flowers large, one-jointed, immediately under the calyx, to each ultimate branchlet, the ultimate branchlets mostly in threes. Calyx-tube about 1.5 cm long and wide, funnel-shaped, brown when dry, smooth, the lobes subpersistent, coriaceous, broadly ovoid, rounded, about 1 cm long and wide.

LUZON, Province of Tayabas, Mount Cadig, near Guinayangan, *Bur. Sci. 20782 Escritor*, March 7, 1913, locally known as *macopa*.

A species strongly characterized by its rather long-petioled, very prominently nerved leaves, its pyramidal panicles, and its large flowers. Following Robinson's arrangement of the Philippine species it falls in the group with *Eugenia squamifera* C. B. Rob., but is entirely different from this and the other species placed near it.

EUGENIA FISCHERI sp. nov. § *Jambosa*.

Frutex glaber, 2 ad 7 m altus, ramis ramulisque teretibus; foliis lanceolatis, oppositis, petiolatis, usque ad 10 cm longis, acuminatis, basi acutis, nervis utrinque circiter 10; floribus terminalibus, solitariis, breviter pedicellatis, circiter 3 cm diametro, calycibus turbinatis, prominente 4-lobatis, pedicellis brevibus bracteolis vel squamis paucis 1 ad 2 mm longis suffultis.

A glabrous shrub 2 to 7 m high, the branches and branchlets terete, rather slender, reddish-brown or somewhat grayish, the ultimate ones 1 to 2 mm in diameter. Leaves lanceolate, opposite, coriaceous, usually olivaceous on the upper surface and pale on the lower surface when dry, shining, 7 to 10 cm long, 1 to 1.5 cm wide, narrowed below to the acute base and above to the slender and rather sharply acuminate apex; lateral nerves about 10 on each side of the midrib, distant, straight, rather prominent on the lower surface, anastomosing in submarginal nerves, petioles 2 to 3 mm long. Flowers white, solitary, terminal, very rarely

also axillary, their pedicels supplied with several irregularly arranged ovate to lanceolate bracteoles or scales which are usually 1 to 2 mm long, acuminate, rarely a linear one up to 5 mm in length present. Buds obovoid. Flowers at least 3 cm in diameter. Calyx-tube funnel-shaped, about 1 cm long, in anthesis nearly 1.5 cm wide at the mouth, brown when dry, the lobes 4, ovate to reniform, about 5 mm long and 10 mm wide. Petals 4, free, suborbicular to obovate, about 12 mm long. Stamens very numerous, 1.5 to 2 cm long.

LUZON, Province of Camarines, Pinamahagan, *For. Bur. 21755 Fischer* (type), April 16, 1914; Tamban River, *For. Bur. 21228 Alvarez*, April 4, 1914, Mount Sipaco, *For. Bur. 21153 Miranda*, April 4, 1914.

The first specimen cited is from gravel bars of a stream bed and the other two from the banks of streams, altitude 10 to 80 meters. The species is manifestly another representative of the stenophyllous type of shrubs growing along streams in habitats subject to inundation. It is apparently most closely allied to *Eugenia squamifera* C. B. Rob., but has entirely different, much narrower leaves and solitary flowers. Mr. Fischer records its Bicol name as *milibig*.

EUGENIA KAMELII sp. nov. § *Jambosa?*

Arbor alta glabra, ramis ramulisque teretibus; foliis ellipticis, coriaceis, usque ad 20 cm longis, nitidis, in siccitate supra brunneis, subtus pallidis, abrupte late breviterque acuminatis, basi rotundatis, nervis utrinque circiter 10, vix prominentibus; floribus fasciculatis, axillaribus et in axillis defoliatis, circiter 3 cm diametro, calycis tubo turbinato, extus parcissime pubescens.

A tall tree, glabrous, the branches and branchlets terete, grayish or brownish, the latter 2 to 4 mm in diameter. Leaves elliptic, opposite, coriaceous, 15 to 20 cm long, 9 to 12 cm wide, shining when dry, the upper surface dark-brown, the lower much paler, apex abruptly, broadly, obtusely short-acuminate, base rounded; lateral nerves about 10 on each side of the midrib, not prominent, irregular, anastomosing 1 to 1.5 cm from the margin, the primary reticulations very lax, not prominent. Flowers white, axillary, and on the branches below the leaves, fascicled, subsessile or shortly pedicelled, in anthesis about 3 cm in diameter. Buds obovoid. Calyx-tube turbinate, externally slightly pubescent with scattered short hairs, about 1 cm long, with four large, persistent, orbicular-reniform lobes about 5 mm long and wide. Petals 4, elliptic to obovate, 10 to 12 mm long, rounded.

SAMAR, Cauayan Valley, *Bur. Sci. 17539 Ramos*, March 26, 1914, in damp forests.

A species perhaps belonging in the section *Eueugenia* rather than *Jambosa*, well characterized by its large, rather obscurely nerved, elliptic leaves, its terete branches and branchlets, and its fascicled sessile or subsessile

flowers which in anthesis are about 3 cm in diameter. It somewhat resembles *Eugenia samarensis* Merr., but is entirely different from that species. Its true alliance seems to be with *Eugenia aherniana* C. B. Rob., but it is very different from the other species placed in this alliance. Its local name in Samar is *damol*.

Dedicated to G. J. Kamel, S. J., one of the earliest investigators of the Philippine flora and perhaps the most able botanist who studied the Philippine flora during the Spanish régime.

EUGENIA LLANOSII sp. nov. § *Jambosa*.

Arbor circiter 10 m alta, ramis ramulisque teretibus; foliis numerosis, confertis, coriaceis, ellipticis vel oblongo-ellipticis, usque ad 5 cm longis, coriaceis, in siccitate brunneis, nitidis, utrinque angustatis, basi acutis, apice obtusis vel acutis, nervis utrinque circiter 8, tenuibus; inflorescentiis terminalibus, brevibus, paucifloris, floribus 4-meris, magnis, confertis, 3.5 ad 4 cm diametro.

A tree about 10 m high, entirely glabrous. Branches and branchlets terete, smooth, brownish. Leaves opposite, numerous, rather crowded on the branchlets, elliptic to oblong-elliptic, coriaceous, brownish when dry, somewhat shining, 3 to 5 cm long, 2 to 2.8 cm wide, subequally narrowed to the acute base and to the obtuse or merely acute apex; lateral nerves about 8 on each side of the midrib, not prominent. Inflorescence terminal, short, few- (usually 3-) flowered, the rachis less than 1 cm in length. Flowers large, 4-merous, the buds obovoid, brown when dry. Calyx widely funnel-shaped, about 1.3 cm in diameter and 1 cm long in anthesis, the lobes four, 4 to 7 mm wide and about 3 mm long. Petals 4, free, orbicular, about 1 cm in diameter. Stamens indefinite, about 1.5 cm long. The flower, in anthesis, white, 3.5 to 4 cm in diameter.

LUZON, Benguet Subprovince, near Baguio, *Merrill 9704*, May 24, 1914, in thickets, limestone region, altitude about 1,300 meters.

A species in the group with *Eugenia everettii* C. B. Rob. and *E. xanthophylla* C. B. Rob., well characterized and differentiated by its crowded leaves which are very much smaller that in those species, and its terminal, short, usually 3-flowered inflorescences. Dedicated to Father A. Llanos, colleague of Father Blanco and the author of several papers on the Philippine flora.

EUGENIA LONGISTYLA sp. nov. § *Jambosa*.

Arbor circiter 10 m alta, glabra, ramis ramulisque teretibus; foliis oblongis ad oblongo-ellipticis, subcoriaceis, usque ad 13 cm longis, utrinque subaequaliter angustatis, basi acutis, apice acuminatis, supra brunneis, nitidis, subtus pallidis, nervis utrinque 8 vel 9, distantibus, subtus valde prominentibus, anastomosantibus, reticulis primariis laxis, distinctis, secundariis obsoletis;

MAP OF PHILIPPINE ISLANDS

SCALE 1: 4000000

SCALE OF MILES

SCALE OF KILOMETERS

LEGEND

Regions in which scattering collections have been made.

Regions in which intensive collecting has been done for one or more months.

Regions in which intensive collecting has been done in all or most months of the year.

Reduced from Map of Philippine Islands by John Bach

PLATE I. THE PHILIPPINE ISLANDS, SHOWING THE PROGRESS OF BOTANICAL EXPLORATION.

inflorescentiis e ramis vetustioribus, brevibus, paucifloris; calycis tubo circiter 1 cm longo, ore 1 cm diametro, inaequaliter 4-lobato.

A glabrous tree about 10 m high, the branches and branchlets terete, brownish, the latter smooth, very slender, the ultimate ones 1 to 2 mm in diameter. Leaves opposite, subcoriaceous, oblong to oblong-elliptic, 7 to 13 cm long, 2.5 to 5 cm wide, subequally narrowed to the acute base and to the acuminate apex, the upper surface brown when dry, somewhat shining, the lower much paler; lateral nerves usually 8 or 9 on each side of the midrib, impressed on the upper surface, very prominent on the lower surface, distant, curved, anastomosing 3 to 6 mm from the margin, the marginal nerves as prominent as the lateral ones, somewhat arched, the primary reticulations lax, prominent, the secondary ones obsolete; petioles 5 to 10 mm long. Flowers in very short, widely scattered, few-flowered inflorescences on the older branches, the rachis and branches less than 1 cm long, apparently 3 to 5 flowers in each inflorescence. Calyx-tube brown, narrowly funnel-shaped, about 1 cm long, 1 cm in diameter at the mouth, narrowed below to the acute base, the lobes 4, unequal, two ovate or suborbicular and 6 to 7 mm long, two subreniform, about 5 mm wide and 2 to 3 mm long. Style 3 cm long.

LUZON, Province of Cagayan, *For. Bur. 17910 Barros*, November, 1912, in dense forests, altitude about 20 meters, the fruits edible. Local name *lobaggan*.

A species well characterized by its prominently nerved leaves and its very short, few-flowered inflorescences which are widely scattered on the older branches. It falls in the group with *Eugenia squamifera* and *E. xanthophylla* in Robinson's arrangement of the Philippine species, but is entirely different from these and the other forms placed here.

EUGENIA MIRANDAE sp. nov. § *Jambosa*.

Arbor circiter 5 m alta, ramis ramulisque teretibus; foliis sessilibus, ellipticis vel orbiculari-ellipticis, crassissime coriaceis, brunneis, nitidis, usque ad 7 cm longis, apice rotundatis ad obtusis, basi rotundatis ad distincte cordatis, nervis primariis utrinque circiter 14, tenuibus, quam secundariis reticulisque vix magis distinctis; inflorescentiis terminalibus, 5 ad 8 cm longis, pauciflores, cymosis; floribus in triadibus dispositis, calycibus infundibuliformibus, circiter 4 mm longis, distincte 4-lobatis.

A tree about 5 m high, glabrous, the branches and branchlets terete, smooth, the ultimate branchlets 3 to 4 mm in diameter. Leaves very thickly coriaceous, sessile, brown and shining when dry, brittle, orbicular-elliptic, 5 to 7 cm long, 3 to 5 cm wide,

shining, apex rounded to somewhat obtuse, base rounded to distinctly cordate; primary lateral nerves slender, scarcely more distinct than are the secondary ones and the reticulations, about 14 on each side of the midrib, rather densely arranged. Inflorescence terminal, 5 to 8 cm long, 4 or 5 primary branches terminating each branchlet, flower bearing only in the upper part, the flowers cymosely arranged, few, in triads on the ultimate branchlets. Flowers sessile, the bracteoles obscure or obsolete. Calyx-tube somewhat funnel-shaped, about 4 mm long, in bud obovoid, narrowed below, the lobes 4, about 1.5 mm wide and 1 mm long or less. Petals orbicular to ovate, 2.5 to 3 mm long, apparently ultimately free.

LUZON, Province of Camarines, Mount Calisuga, *For. Bur. 21687 Miranda,* April 24, 1914, in mossy forest at the summit, altitude about 700 meters.

A species well characterized by its very thickly coriaceous, sessile leaves with rather densely arranged nerves and which are rounded at both ends or the base distinctly cordate. It somewhat resembles *Eugenia congesta* Merr., but is quite different in the characters of its leaves and inflorescence.

EUGENIA PALLIDIFOLIA sp. nov. § *Jambosa.*

Arbor glabra, ramis ramulisque teretibus; foliis oppositis, oblongo-ellipticis, usque ad 11 cm longis, in siccitate pallidis, utrinque subaequaliter angustatis, basi acutis, apice acuminatis; nervis lateralibus utrinque circiter 8, subtus valde prominentibus; floribus (semper?) terminalibus, solitariis, brevissime pedicellatis, calycis tubo cupulato, circiter 1.5 cm longo, distincte 4-lobato.

A glabrous tree, the branches and branchlets slender, terete, usually grayish, the branchlets sometimes reddish-brown. Leaves opposite, oblong-elliptic, chartaceous to subcoriaceous, 7 to 11 cm long, 3.5 to 5 cm wide, pale when dry, shining, eglandular, the lower surface much paler than the upper, subequally narrowed to the acute base and to the rather prominently acuminate apex; lateral nerves prominent on the lower surface, distant, about 8 on each side of the midrib, curved, anastomosing with the equally prominent and slightly undulate marginal nerves 3 to 4 mm from the edge of the leaf, reticulations very slender; petioles 3 to 5 mm long. Flowers terminal, solitary (always?), rather large, very shortly pedicellate, the pedicel subtended by several pairs of ovate to lanceolate, acuminate, 1 to 2 mm long scales or bracts. Calyx cup-shaped, pale-brown when dry, glandular-punctate, about 1.5 cm long and at least as thick, the limb very slightly spreading or recurved, and with four rounded lobes wider than long, 5 to 6 mm wide, 3 to 4 mm long. Style 2.5 cm long.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 16588, 20489* (type) *Ramos*, September, 1912, and February, 1913, the former with buds, the latter with old flowers.

A species allied to *Eugenia everettii* C. B. Rob., from which it is distinguished by its pale, fewer nerved leaves which are different in shape.

EUGENIA SAMARENSIS sp. nov. § *Jambosa.*

Arbor alta, glabra, ramis ramulisque crassis, ramulis quadrangularis; foliis brevissime petiolatis, coriaceis, oblongo-ellipticis ad anguste obovato-ellipticis, usque ad 35 cm longis, apice breviter late acuminatis, basi rotundatis vel obscure cordatis, nervis utrinque circiter 18, subtus valde prominentibus; floribus fasciculatis, e ramis defoliatis, circiter 3.5 cm diametro.

A tall tree, entirely glabrous, the branches and branchlets stout, the former terete or obscurely angled, the latter distinctly 4-angled, brownish or grayish. Leaves opposite, coriaceous, oblong-elliptic to narrowly obovate-elliptic, 30 to 35 cm long, about 14 cm wide, shining when dry, the upper surface brown, the lower much paler, apex abruptly and broadly acuminate, base rounded or obscurely cordate; lateral nerves about 18 on each side of the midrib, very prominent on the lower surface, nearly straight, somewhat ascending, irregular, anastomosing 6 to 9 mm from the margin to form very prominent, somewhat arched marginal nerves, with a secondary, much fainter submarginal nerve nearer the margins, the reticulations prominent, lax; petioles very stout, 2 mm long or less. Flowers white, numerous, fascicled on the branches below the leaves, the pedicels stout, up to 8 mm in length. Calyx-tube funnel-shaped, about 5 mm long and wide, the lobes persistent, orbicular, rounded, about 5 mm long and wide. Petals orbicular-obovate, about 1 cm long. Stamens very numerous, up to 2 cm in length.

SAMAR, Cauayan Valley, *Phil. Pl. 1671 Ramos*, April, 1914, in forests along streams.

This striking species is well characterized by its large, prominently nerved leaves, but especially by its fascicled, numerous, rather large flowers which are arranged on the branches below the leaves. In Robinson's key to the Philippine species it falls in the group with *Eugenia gigantifolia* Merr., but is entirely different from this species, and all others placed near it, in its fascicled flowers.

EUGENIA TAYTAYENSIS sp. nov. § *Jambosa.*

Arbor circiter 15 m alta, glabra, ramis vetustioribus teretibus, junioribus ramulisque prominente acute quadrangulatis; foliis oppositis, oblongis, coriaceis, usque ad 15 cm longis, breviter acuminatis, basi rotundatis ad leviter cordatis, nervis utrinque circiter 12, subtus prominentibus, distantibus; paniculis termina-

libus, usque ad 10 cm longis dense multifloris; floribus sessilibus, calycibus infundibuliformibus, circiter 5 mm longis, 4-lobatis.

A tree about 15 m high, glabrous, the older branches terete, grayish, the younger ones and the ultimate branchlets sharply and prominently 4-angled, almost winged. Leaves opposite, oblong, coriaceous, 10 to 15 cm long, 3 to 5 cm wide, the upper surface brownish or olivaceous when dry, somewhat shining, the lower somewhat paler, apex shortly acuminate, base rounded to somewhat cordate; lateral nerves about 12 on each side of the midrib, prominent on the lower surface, irregular; anastomosing and forming a distinct marginal nerve 3 to 5 mm from the edge of the leaf, the reticulations rather lax; petioles 2 mm long or less. Panicles terminal, dense, many-flowered, branched from the base, up to 10 cm long and as wide or wider than long. Flowers white, odorless, crowded, mostly in triads on the ultimate branchlets, sessile, the buds obovoid. Calyx-tube funnel-shaped, about 5 mm long, 3 to 3.5 mm wide at the mouth, narrowed below into a short pseudostalk, dark-brown when dry, the lobes 4, reniform to ovate-reniform, about 2 mm wide and 1 mm long. Petals 4, free, concave, orbicular to orbicular-obovate, 4 to 5 mm long. Stamens indefinite, 5 to 8 mm long.

PALAWAN, Taytay, *Merrill 9201*, April 29, 1913, in forests at low altitudes.

This species is strongly marked by its sharply 4-angled branchlets, and its densely many-flowered terminal panicles. Following Robinson's arrangement of the Philippine forms it falls in the group with *Eugenia barnesii* Merr., but is entirely different from that species in all characters.

EUGENIA TRIANTHA sp. nov. § *Jambosa.*

Arbor glabra, ramis ramulisque teretibus; foliis oppositis, breviter petiolatis, oblongis ad oblongo-obovatis, coriaceis, usque ad 16 cm longis, utrinque subaequaliter angustatis, basi acutis, apice acuminatis, nervis utrinque circiter 10, subtus valde prominentibus; inflorescentiis terminalibus, trifloris, sessilibus vel subsessilibus; floribus subsessilibus, calycibus circiter 1 cm longis, 1.5 cm diametro, prominente 4-lobatis.

A glabrous tree, the branches and branchlets terete, grayish, slender, the latter 2 mm in diameter or less. Leaves opposite, oblong to oblong-obovate, 9 to 16 cm long, 4 to 8 cm wide, rather pale when dry, shining, subequally narrowed to the acute base and to the acuminate apex; lateral nerves about 10 on each side of the midrib, somewhat ascending, very prominent on the lower surface, anastomosing in the marginal nerve 4 to 8 mm from the edge of the leaf; petioles 2 to 3 mm long. Inflorescence

terminal, of three subsessile flowers on short stout pedicels, the pedicels 2 mm long or less. Calyx broadly cup-shaped, rounded below, about 1 cm long, the mouth about 1.5 cm in diameter. Lobes 4, subcoriaceous, somewhat reniform, about 8 mm wide and 4 mm long.

MINDANAO, Butuan Subprovince, Mount Naupit, *For. Bur. 20558 Miranda,* August 10, 1913, altitude about 100 meters.

The alliance of this species is apparently with *Eugena crassipes* C. B. Rob., but the leaves and inflorescence are very different from those of that species. From *Eugenia megalantha* C. B. Rob. it differs in its terminal inflorescence.

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STUDIES ON PHILIPPINE ANONACEAE, I

By E. D. MERRILL [1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The family *Anonaceae* is well represented in the Philippines, and current collections present rather a high percentage of novelties in this family. No attempt has been made here critically to study all the Philippine species, but merely to describe some of the apparently new forms in our abundant accumulated material, and to discuss some questions of nomenclature in regard to both genera and species. Twenty-four new species are proposed in the genera *Uvaria, Alphonsea, Dasymaschalon, Meiogyne, Polyalthia, Mitrephora, Pseuduvaria, Orophea,* and *Goniothalamus.* The designation *Desmos* of Loureiro is used in place of *Unona* for the oriental species, excluding the section *Dasymaschalon* which is here treated as a distinct genus. The genus recently described by Diels from New Guinean material as *Papualthia* is found to be represented in the Philippines by six species previously described under *Polyalthia* and *Unona.* In studying this Philippine *Papualthia* material, my attention was again called to the species of the Mariana Islands described by Safford as *Papualthia mariannae* and by me erroneously referred to *Polyalthia,* with the result that I have proposed to make *Papualthia mariannae* Safford the type of a new genus *Guamia,* its alliance being rather with *Oncodostigma* than with *Papualthia. Griffithianthus* is proposed as a new generic name for *Griffithia* Maingay, not of Wight and Arnott, and the genus is extended to the Philippines by the transfer of *Mitrephora merrillii* C. B. Rob. and the reduction of *M. viridifolia* Elm.

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Following Boerlage, *Meiogyne* is recognized as a distinct genus. The genus *Pseuduvaria* of Miquel, considered by Boerlage as a section of *Mitrephora* under the name of *Para-Orophea,* is recognized as a valid genus intermediate between *Orophea* and *Mitrephora* in floral characters but differing from both in being diœcious. The generic designations new to the *Philippine* flora are *Desmos, Dasymaschalon, Papualthia, Griffithianthus, Meiogyne,* and *Pseuduvaria.* Two of the species described by Blanco that have previously been considered as doubtful have been definitely identified and the synonymy has been adjusted.

UVARIA Linnaeus

UVARIA LANCIFOLIA sp. nov.

Frutex ut videtur scandens, partibus junioribus ferrugineopubescentibus, vetustioribus subglaber; foliis lanceolatis, subcoriaceis, nitidis, acuminatis, basi obtusis vel rotundatis, usque ad 15 cm longis, nervis utrinque 12 ad 18, prominentibus; floribus longe pedicellatis, circiter 1.8 cm diametro, extra-axillaribus subterminalibusque, paucis; connectivo truncato, vix producto.

A shrub, apparently scandent, when young distinctly pubescent with short, stellate, ferruginous hairs, in age becoming nearly glabrous. Branches terete, slender, dark-colored when dry, somewhat glaucous, the young branchlets ferruginous-pubescent. Leaves subcoriaceous, lanceolate, 10 to 15 cm long, 2.5 to 4.5 cm wide, narrowed upward to the rather prominently acuminate apex, the base narrowed, obtuse to rounded, the upper surface greenish-olivaceous, shining, when mature entirely glabrous, the lower surface sparingly pubescent; lateral nerves 12 to 18 on each side of the midrib, prominent, curved-ascending, anastomosing, the reticulations lax, not prominent; petioles about 3 mm long, puberulent. Flowers reddish-brown, extra-axillary and subterminal, solitary or in greatly reduced, 2- or 3-flowered cymes, all parts ferruginous-pubescent, the pedicels 1.5 to 2 cm with a prominent bracteole at about the middle. Sepals broadly ovate, united below, pubescent, obtuse, about 5 mm long. Petals subequal, spreading, elliptic-ovate, about 8 mm long, 6 mm wide, rounded or obtuse, pubescent. Stamens indefinite, about 4 mm long, linear-oblong, connective but slightly produced, truncate, somewhat oblique. Carpels crowded, linear-oblong, pubescent, about 4 mm long. Fruits glabrous or nearly so, globose to ellipsoid-ovoid, about 1 cm long.

LUZON, Province of Zambales, San Antonio, *F. C. Gates 5495* (type), *6647,* January and December, 1913, collected by *Ariño* and *Canonizado* in

the Casagtan forest, its local, Ilocano, name being *al-alagat;* Subic, *Hallier s. n.* Perhaps referable here is a fruiting specimen from the District of Zamboanga, Mindanao, *Bur. Sci. 16394 Reillo,* October, 1912.

A species in aspect very different from the other known Philippine forms, distinguished by its rather long pediceled, rather small flowers, its prominently nerved, lanceolate leaves, and in being nearly glabrous at full maturity.

UVARIA ELLIPTIFOLIA sp. nov.

Frutex scandens, prominente ferrugineo-pubescentibus; foliis ellipticis, coriaceis, usque ad 15 cm longis, apice retusis rotundatis vel late obscure acuminatis, basi rotundatis ad leviter cordatis, nervis utrinque circiter 9, valde prominentibus; floribus extra-axillaribus, circiter 5 cm diametro, solitariis vel paucis, sepalis deorsum valde connatis, petalis utrinque cinereopuberulis; connectivo longe producto.

A scandent shrub, apparently of large size, the young branches, inflorescences, and leaves, especially on the lower surface, very prominently and rather densely ferruginous-pubescent with stellate hairs. Older branches dark-colored, glabrous. Leaves elliptic, coriaceous, 10 to 15 cm long, 6 to 9 cm wide, brownish or brownish-olivaceous when dry, apex retuse, rounded, to broadly and obscurely acuminate, base rounded to somewhat cordate, the upper surface ferruginous stellate-pubescent on the midrib and lateral nerves, the indumentum on the surface otherwise somewhat deciduous, the lower surface more densely pubescent than the upper; lateral nerves about 9 on each side of the midrib, very prominent, anastomosing, the reticulations lax; petioles densely ferruginous-pubescent, 3 to 5 mm long. Flowers yellowish-brown, extra-axillary, solitary or two or three together, the pedicels 1 cm long or less, densely ferruginous-pubescent as is also the reniform, somewhat amplexicaul bracteole which is about 10 mm wide and 6 mm long. Calyx pubescent, the lobes united below, reniform, rounded, 5 to 6 mm long and 6 to 10 mm wide. Petals subequal, subelliptic, on both sides densely cinereous-puberulent, or externally, when young, yellowish or ferruginous, rounded, about 2 cm long and 1.4 cm wide. Stamens indefinite, closely packed, about 5 mm long, the outer ones somewhat shorter than the inner, and the outermost reduced to staminodes, linear-oblong, the antheriferous part about as long as the connective which is flattened, oblong, obtuse, about 1 mm wide and 2.5 mm long, the apex obscurely obliquely truncate, puberulent. Carpels numerous, linear-oblong; densely pubescent, about 5 mm long, the stigma thickened, short, glabrous.

Mature fruits said to be edible, oblong-cylindric, glabrous, about 1.5 cm long and 1 cm in diameter when dry, each with from 2 to 4 seeds, the pedicels about 3 cm long, the thickened receptacle about 2.5 cm in diameter.

BILIRAN, *Bur. Sci. 18878 McGregor* (type), June, 1914, in forests, altitude about 300 meters. NEGROS, in dense forests, *For. Bur. 7331 Everett*, January, 1907, locally known as *saguin-saguin*.

A species well characterized by its elliptic leaves, its rather dense, ferruginous, stellate indumentum, and its prominently produced, thin, flattened, puberulent connectives.

UVARIA LEYTENSIS (Elm.) comb. nov.

Unona leytensis Elm. Leafl. Philip. Bot. 5 (1913) 1744.

LUZON, Province of Bataan, *For. Bur. 87 Barnes, For. Bur. 2051 Borden, Merrill 3301:* Province of Laguna, Mount Maquiling, *For. Bur. 19781 Whitford.* LEYTE, *Elmer 7365*, distributed as *Unona ebracteolata* Presl. MINDANAO, Province of Agusan, *Elmer 13880* (type): District of Zamboanga, *Hallier.*

All of the above specimens are in fruit, and all are manifestly *Uvaria*, not *Unona.* They have the characteristic fleshy fruits of *Uvaria*, the scandent habit, and the very few hairs that are present are stellate. From the material available I can see little reason for distinguishing *Uvaria nudistellata* Elm. from *U. leytensis* Merr., but the specimens are not directly comparable, the type of the former being in fruit, and of the latter in flower, and of which I have seen merely young buds. Another close ally is *Uvaria stellata* Merr. The alliance of the species is certainly with the Javan *Uvaria concava* T. & B., which has fruits 4 to 8 cm in length, while our species has fruits less than 4 cm long. Still another very closely allied form is *Uvaria lurida* Hook f. & Th.

UVARIA SIBUYANENSIS Elm. Leafl. Philip. Bot. 5 (1913) 1747.

This species was based on *Elmer 12322* from the Island of Sibuyan, and must be excluded from the genus, as it is not a *Uvaria.* The flowers are unknown, and until the species is again collected and with flowers, its generic position remains doubtful. It apparently belongs in *Goniothalamus.*

UVARIA MICRANTHA (A. DC.) Hook. f. & Th. Fl. Ind. (1855) 103; King in Ann. Bot. Gard. Calcutta 4 (1893) 26, *t. 18;* Finet & Gagnep. in Lecomte Fl. Gén. Inde-Chine 1 (1907) 54.

Guatteria micrantha A. DC. Mém. Anon. (1832) 42.

LUZON, Province of Batangas, *Bur. Sci. 22403 Ramos*, August, 1915. MINDORO, Puerto Galera, *Merrill 3345*, October, 1903. PALAWAN, Taytay, *Merrill 9271*, May, 1913. PANAY, *Bur. Sci. 21231 Escritor*, June, 1913, all from low altitudes, on or near the seashore.

This species is reported from Burma, Indo-China, Penang, Malacca, and Sumatra, and its range is now extended to the Philippines by the identification of several specimens from the Archipelago. Our material agrees with the descriptions, the figure, and specimens from Indo-China identified by Finet & Gagnepain as *Uvaria micrantha* Hook. f. & Th.

GRIFFITHIANTHUS nomen novum

Griffithia Maingay non Wight & Arnott.

The generic name *Griffithia* of Maingay was not published until 1893, and then by King [2] from Griffith's manuscript, although characterized by Maingay many years earlier. The type of the genus is *Polyalthia magnoliaeflora* Maingay ex Hook. f. & Th.,[3] published with the comment: "referred to a new genus in Maingay's MSS." The specific name was altered from Maingay's *magnoliaepetala* to *magnoliaeflora*.

The generic designation *Griffithia* was used in 1834 by Wight and Arnott for a group of rubiaceous plants, and about 14 specific names have been published under *Griffithia* of Wight & Arnott by various authors. Although *Griffithia* W. & A. is now considered to be a synonym of *Randia*, I maintain that the earlier use of the name by Wight & Arnott invalidates *Griffithia* of Maingay, and accordingly here propose a slight modification of Maingay's generic name.

The genus has three species in the Malay Peninsula and at least one in the Philippines.

GRIFFITHIANTHUS MAGNOLIAEFLORUS (Maingay) comb. nov.

Polyalthia magnoliaeflora Maingay ex Hook. f. & Th. in Hook. f. Fl. Brit. Ind. 1 (1872) 64.

Griffithia magnoliaepetala Maingay ex King in Ann. Bot. Gard. Calcutta 4 (1893) 9, *t. 218*.

Malacca and Perak.

GRIFFITHIANTHUS CUPULARIS (King) comb. nov.

Griffithia cupularis King in Ann. Bot. Gard. Calcutta 4 (1893) 9, *t. 219*.

Perak.

GRIFFITHIANTHUS FUSCUS (King) comb. nov.

Griffithia fusca King in Ann. Bot. Gard. Calcutta 4 (1893) 10, *t. 220*.

Perak.

GRIFFITHIANTHUS MERRILLII (C. B. Rob.) W. H. Brown comb. nov.

Mitrephora ferruginea Merr. in Govt. Lab. Publ. (Philip.) 17 (1904) 16, excl. descr. fl., Philip. Journ. Sci. 1 (1906) Suppl. 54, non Boerl.
Mitrephora merrillii C. B. Rob. in Bull. Torr. Bot. Club 35 (1908) 67.
Mitrephora viridifolia Elm. Leafl. Philip. Bot. 5 (1913) 1716.

LUZON, Province of Ilocos Norte, *For. Bur. 13918 Merritt & Darling:* Province of Nueva Ecija, *For. Bur. 22357 Alvarez:* Province of Zambales, *Hallier, For. Bur. 382 Maule:* Province of Rizal, *Bur. Sci. 983 Ramos:*

[2] Ann. Bot. Gard. Calcutta 4 (1893) 8.
[3] Hook. f. Fl. Brit. Ind. 1 (1872) 64.

Province of Bataan, *For. Bur. 635, 2045 Borden, For. Bur. 2629 Meyer, For. Bur. 5770 Curran, For. Bur. 61, 367, 513 Barnes, Elmer 7000, 6734, Williams 111, Bur. Sci. 1878 Foxworthy, Merrill 3728:* Province of Tayabas, *Bur. Sci. 13091, 13107 Foxworthy & Ramos, Bur. Sci. 19442 Ramos:* Province of Camarines, *Ahern 67, 253.* MINDORO, *For. Bur. 6202, 3703 Merritt, Whitford 1374, For. Bur. 11876 Amarillas.* SAMAR, *For. Bur. 12852 Rosenbluth, Bur. Sci. 17496 Ramos.* MINDANAO, Province of Agusan, *Elmer 14184:* Province of Misamis, *For. Bur. 11894 Miranda:* District of Lanao, *For. Bur. 23163 Agama:* District of Cotabato, *For. Bur. 3927 Hutchinson:* District of Zamboanga, *For. Bur. 9205 Whitford & Hutchinson, Hallier:* District of Davao, *Williams 2890.*

This widely distributed species presents considerable variation in the size of its leaves and in its indumentum, varying from rather densely and softly stellate ferruginous-pubescent to forms that are but slightly stellate-pubescent on the midrib and nerves only so far as the leaves are concerned. Practically all intergrades are presented in our extensive series of specimens, and I am of the opinion that but a single species is represented.

The species was originally described as *Mitrephora ferruginea* Merr., but it was soon discovered that two different species were included in the description, fruiting specimens of the form here considered, and flowering specimens of an entirely different species, a true *Mitrephora*, and *M. lanotan* (Blanco) Merr. Robinson proposed the name *Mitrephora merrillii* in place of *M. ferruginea*, as Boerlage had previously described another species under the latter specific name. This change was made without the examination of flowering specimens. *Mitrephora viridifolia* Elm. was more recently described from flowering specimens as a species distinct from *M. merrillii*, but I do not consider the form sufficiently strongly characterized to be distinguished, unless one wishes to propose, from the material I have above referred to *Griffithianthus merrillii*, several very closely allied species to be separated by merely trivial characters.

While the species is represented by a large number of specimens, nearly all of them are in fruit, and no flowering specimens were received that with certainty could be referred to *Mitrephora merrillii*, until 1913. An examination of these flowers, and of those described by Elmer under *Mitrephora viridifolia*, shows at once that the species is not a *Mitrephora*, that it does not even belong in the same tribe with *Mitrephora*, and that it is apparently generically identical with the group characterized by Maingay as *Griffithia*, a genus previously known only from the Malay Peninsula. Even in *Griffithia* (=*Griffithianthus*) it is somewhat anomalous, differing, apparently, in its stellate indumentum (I have seen no specimens of the species described by King, and in his descriptions and figures there is no indication that the indumentum is stellate), its smaller flowers, and its sepals not or but very slightly imbricate.

The flowers are axillary, short-pediceled, densely ferruginous-pubescent, each pedicel with a broadly ovate, rounded or obtuse, 3.5 mm long bracteole. Sepals broadly ovate, densely ferruginous-pubescent on both surfaces, about 3 mm long, obtuse to subacute, valvate or obscurely imbricate at the base. Outer petals oblong, thick, obtuse, 8 to 9 mm long, 4 mm wide, imbricate, somewhat keeled inside, the inner three similar in size or a little shorter, valvate by their broadened margins, cohering in bud and perhaps in young flowers, later spreading, the basal part excavated, much thinner than the upper one-half, but not arched or vaulted, base broad. Stamens about 25,

rather crowded, flattened, about 1.8 mm long, 1 mm wide, the filamentous part as long as the antheriferous part, the connectives broad, thin, not produced, not entirely concealing the cells. Carpels usually 8 to 12, 25 mm long, oblong, crowded, densely hirsute; ovule solitary, basal; style cylindric, glabrous, about 1 mm long, somewhat curved.

ALPHONSEA Hooker f. & Thomson

ALPHONSEA ARBOREA (Blanco) comb. nov.

Macanea arborea Blanco Fl. Filip. (1837) 431.
Monodora myristica Blanco l. c. ed. 2 (1845) 300, ed. 3, 2 (1878) 193, non Dun.
Monocarpia blancoi F.-Vill. Novis. App. (1880) 6.
Alphonsea philippinensis Merr. in Govt. Lab. Publ. (Philip.) 35 (1906) 9.

LUZON, Province of Rizal, Bosoboso, *For. Bur. 2010 Ahern's collector:* Province of Laguna, Mount Maquiling, *For. Bur. 20288 Villamil:* Province of Tayabas, *Merrill 1925, 1988, 2062, 2591, For Bur. 3215 Hagger:* Province of Camarines, *For. Bur. 10499 Curran.* MINDORO, *Bur. Sci. 939 Mangubat.* TICAO, *For. Bur. 1015 Clark.* MASBATE, *Merrill 3075.* LEYTE, *For. Bur. 12710 Rosenbluth.* CEBU, *For. Bur. 6439 Espinosa.* MINDANAO, District of Zamboanga, *For. Bur. 22020 Villamil.*

Local names: *sapiro* (Cebu); *lanutan* (Leyte, Tayabas, Mindoro); *calay* (Zamboanga, Laguna); *lanutan itum* (Ticao); *bolon* (Camarines).

Blanco's *Macanea arborea* does not appear in Index Kewensis. In the second edition of the Flora de Filipinas he erroneously reduced it to the American *Monodora myristica* Dun. *Monocarpia blancoi* F.-Vill. is merely a new name for Blanco's species accompanied by a description based on specimens from Luzon. *Alphonsea philippinensis* Merr. is certainly identical with *Macanea arborea* Blanco, and Blanco's specific name is accordingly here accepted.

Blanco's description is unmistakable and applies in all respects to the species as here interpreted. His material was from Luzon and Cebu; the native name *calai* cited by him is still in use for this species, and is apparently exclusively applied to it; the time of flowering agrees. Even if Blanco's description were very poor, which it is not, the phrase describing the fruit would unmistakably locate the form: "La corteza exterior del fruto se parece enteramente al del llamado en Manila Maméi [*Lucuma mamosa* Gaertn.]." The fruits are very hard, woody, brown, rounded at the apex, up 9 cm long and 5 to 6 cm in diameter.

F.-Villar placed the species in the genus *Monocarpia*, but saw no flowers. The stamens in our material are miliusioid and exclude the species from Miquel's genus in which the connectives are produced and truncate.

ALPHONSEA SESSILIFLORA sp. nov.

Frutex vel arbor parva, ramulis floribusque ferrugineo-pubescentibus; foliis lanceolatis, in siccitate pallidis, chartaceis, 5 ad 8 cm longis, acuminatis, basi acutis, nervis utrinque circiter 11, tenuibus, indistinctis; floribus axillaribus, solitariis, sessilibus, sepalis petalisque extus ferrugineo-pubescentibus.

A shrub or a small tree, the branches very slender, terete,

glabrous, grayish, the younger branchlets distinctly ferruginous-pubescent. Leaves lanceolate, chartaceous, 5 to 8 cm long, 1.3 to 2.5 cm wide, pale and of the same color on both surfaces when dry, shining, gradually narrowed upward to the acuminate apex, the base obtuse or acute, the upper surface entirely glabrous, the lower slightly ciliate-hirsute on the midrib, becoming glabrous; lateral nerves slender, obscure, about 11 on each side of the midrib, the rather lax reticulation nearly as prominent; petioles ferruginous-pubescent, 2 to 3 mm long. Flowers axillary, sessile, solitary, the mature buds globose. Sepals orbicular, rounded, appressed fulvous-pubescent, 2.5 mm long. Petals very thickly coriaceous, the outer three fulvous-pubescent externally, ovate, 7 mm long, the inner three very much thicker, 5 mm long, slightly pubescent. Stamens indefinite, 1.5 to 2 mm long, the connectives oblong, truncate, 0.8 mm in diameter. Carpels about 7, oblong, 2 mm long, densely hirsute; ovules 6, 1-seriate; stigma 0.5 mm long, glabrous.

LUZON, Province of Nueva Ecija, Sabani, *For. Bur. 22118 Alvarez*, December, 1910. *Bur. Sci. 13617 Ramos*, from Rizal Province, Luzon, may represent the same species. It is in fruit and differs in its leaves being remarkably shiny.

The species has the vegetative characters of *Polyalthia*, but its flowers do not admit referring it to that genus. I am not satisfied entirely with its reference to *Alphonsea*, but it seems to agree in essential characters with this genus, as described, better than with any other genus known to me. The sessile, solitary, axillary flowers are characteristic.

DESMOS Loureiro

Safford [4] has recently conclusively shown that the genus *Unona* Linn. f. was based on an American species, *Unona descreta* Linn. f., and that Vahl was in error in placing under *Unona* the Asiatic *U. discolor* Vahl=*Desmos chinensis* Lour. The Indo-Malayan material that has by various authors been referred to *Unona* cannot properly be considered under this generic designation, and Safford has correctly taken up the generic appellation *Desmos* for the oriental forms, this genus having been proposed by Loureiro in 1790. Safford erred, however, in extending *Desmos* to cover the section *Dasymaschalon* of *Unona*, as *Dasymaschalon* is a perfectly valid genus which cannot properly be placed in the same tribe with *Unona* auct.=*Desmos* Lour. The only Philippine species that can definitely be referred to *Desmos* is *Desmos chinensis* Lour. The other Philippine forms described under *Unona* apparently belong in other genera.

[4] Bull. Torr. Bot. Club **39** (1912) 501–508.

DESMOS CHINENSIS Lour. Fl. Cochinch. (1790) 352.

Unona discolor Vahl Symb. 2 (1791) 63, *t. 26.*

LUZON, Manila, *Ahern 730* (cult.). PALAWAN, *Merrill 9279, Bur. Sci. 210 Bermejos.* BASILAN, *For. Bur. 20092 Miranda.*

The other Philippine species that have been described under *Unona* in recent years are as follows: *Unona agusanensis* Elm. = *Polyalthia; Unona leytensis* Elm. = *Uvaria; Unona sympetala* C. B. Rob. = *Papualthia; Unona miniata* Elm. probably = *Polyalthia* (flowers not seen by me); *Unona palawanensis* Elm. probably = *Polyalthia* (flowers not seen by me); *Unona mindorensis* Merr., proper generic designation doubtful, but not *Desmos; Unona rubra* Merr., fruits unknown, but probably not *Desmos.*

The following extra-Philippine species must be considered under *Desmos*, not under *Unona:*

DESMOS HAHNII (Finet & Gagnep.) comb. nov.

Unona hahnii Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4:67, et in Lecomte Fl. Gén. Indo-Chine 1 (1907) 58, *t 8, B.*

Cambodia.

DESMOS DINHENSIS (Pierre) comb. nov.

Unona dihensis Pierre ex Finet & Gagnep. l. c. 79, 62, *t. 11 B.*

Cochinchina.

DESMOS HANCEI nom. nov.

Unona velutina Hance in Journ. Bot. 15 (1877) 328; Finet & Gagnep. Lecomte Fl. Gén. Indo-Chine 1 (1907) 61.

Cambodia.

DESMOS TEYSMANNII (Boerl.) comb. nov.

Unona teysmannii Boerl. in Ic. Bogor. 1 (1899) 103.

Borneo.

DESMOS CHRYSEUS (Miq.) comb. nov.

Monoon chryseum Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 15.
Unona chrysea Boerl. in Ic. Bogor. 1 (1899) 102.

Sumatra.

DESMOS COSTATUS (Miq.) comb. nov.

Unona costata Miq. Fl. Ind. Bat. Suppl. (1861) 376.

Sumatra.

DESMOS SUBBIGLANDULOSUS (Miq.) comb. nov.

Unona subbiglandulosa Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 11.

Borneo.

DASYMASCHALON (Hook. f. & Th.) Torre & Harms

This genus, first proposed as a section of *Unona* by Hooker f. and Thomson,[5] is very distinct from all other groups, presents no intermediate forms between it as a genus and the allied

[5] Fl. Ind. 1 (1875) 61.

groups, and certainly merits general recognition as a valid genus. The name was taken from *Unona dasymaschala* Blume Fl. Jav. Anon. 55, *t. 27*, although the first species cited under the section was the allied *Unona longiflora* Roxb. It should be noted that Blume's figure is not correct in presenting the flowers with separate petals. In *Dasymaschalon* the petals, 3 in number, never 6, are firmly united by their broad margins, never separate, and the corolla falls as a whole. Boerlage,[6] who treats the group merely as a section of *Unona*, has separated it from the sections *Desmos* and *Stenopetalum* of *Unona* which he places in his series *Unonées*, and rather illogically places *Dasymaschalon*, still as a section of *Unona*, under the series *Mélodorées*. While Boerlage is probably correct in placing *Dasymaschalon* in the alliance with *Melodorum*, the genus *Unona* certainly cannot logically be considered as partly in one tribe and partly in another, under the same generic name, as Boerlage proposed to do.

Dasymaschalon was retained merely as a section of *Unona* until 1901, when Torre & Harms raised it to generic rank. In this they have been followed by Finet & Gagnepain,[7] who follow Boerlage in considering *Dasymaschalon* in the alliance with *Melodorum* rather than with *Unona* auct., non Linn. f. (=*Desmos* Lour.). I believe that Boerlage is correct in placing it in the tribe *Melodorieae* (including *Xylopieae*) rather than retaining it in the tribe *Unoneae* with the two other sections of the genus *Unona* (=*Desmos*).

As originally delimited the genus included those species of *Unona* that present but three petals, and these quite united by their broad margins and falling as a whole, the carpels with several ovules, and the fruits moniliform. Its limits should be extended to include several Philippine forms having the prominent perianth characters of *Dasymaschalon* but with carpels having but 1 or 2 ovules, and the fruits ovoid to ellipsoid, not at all moniliform. One species is common and very widely distributed in the Philippines, having originally been placed in *Unona*, but later transferred to *Polyalthia* on the basis of the number of ovules; yet no species of *Polyalthia* presents the peculiar petal characters of this plant, which does occasionally present carpels with 2 ovules, and fruits with 2 seeds. The genus includes the following known species:

[6] Ic. Bogor. 1 (1899) 84, 87, 98, 126.

[7] Bull. Soc. Bot. France 53 (1906) Mém. 4: 143; Lecomte Fl. Gén. Indo-Chine 1 (1907) 104.

DASYMASCHALON LOMENTACEUM Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 143; Lecomte Fl. Gén. Indo-Chine 1 (1907) 105.

Cochinchina and Cambodia.

DASYMASCHALON MACROCALYX Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 143.

Cochinchina and Cambodia.

DASYMASCHALON LONGIFLORUM (Roxb.) Finet & Gagnepain in Bull. Soc. Bot. France 53 (1906) Mém. 4: 143.

Unona longiflora Roxb. Fl. Ind. 2 (1832) 668.
Desmos longiflorus Safford in Bull. Torr. Bot. Club. 39 (1912) 507.

Eastern Himalaya, Khasia Hills, etc., to Perak.

DASYMASCHALON BLUMEI Finet & Gagnep. in Bull. Soc. Bot. France 53 (1906) Mém. 4: 143.

Unona dasymaschala Blume Fl. Jav. Anon. (1828–36) 55, *t. 27*.
Desmos dasymaschalus Safford in Bull. Torr. Bot. Club. 39 (1912) 507.

Burma to Sumatra and Java.

DASYMASCHALON COELOPHLOEUM (Scheff.).

Unona coelophloea Scheff. in Flora 52 (1869) 300; Boerl. in Ic. Bogor. 1 (1899) 127, *t. 43*.

Java; cult. in hort. Bot. Bogor. XI, A, 25; XVI, E, 70.

DASYMASCHALON CLEISTOGAMUM (Burck).

Unona cleistogama Burck ex Boerl. in Ic. Bogor. 1 (1899) 127, 201, *t. 72*.

Riouw; cult in Hort. Bot. Bogor. IV, G, 45a, 58a.

Specimens of all of the above species are in the herbarium of the Bureau of Science

DASYMASCHALON CLUSIFLORUM (Merr.) comb. nov.

Unona clusiflora Merr. in Govt. Lab. Publ. (Philip.) 35 (1906) 13.
Polyalthia clusiflora C. B. Rob. in Bull. Torr. Bot. Club. 35 (1908) 68.

This Philippine species is represented by over 30 specimens, ranging from the Babuyanes Islands on the north to Palawan and southern Mindanao. The material presents considerable variation, especially in the length of the flowers, but the vegetative characters are rather constant. Abundant fruiting material nearly always presents fruits with but a single seed, sometimes with two superposed seeds, but the fruits are never in the slightest degree moniliform.

Var. **MEGALANTHUM** var. nov.

A typo differt floribus multo majoribus, usque ad 11 cm longis.

LUZON, Province of Camarines, Caramoan Peninsula, *For. Bur. 10686 Curran*, June, 1908.

DASYMASCHALON OBLONGATUM sp. nov.

Arbor parva, circiter 10 m alta, floribus parcissime pubescentibus exceptis glabra; ramis ramulisque teretibus, gracilis;

foliis oblongo-lanceolatis, chartaceis vel leviter coriaceis, usque ad 11 cm longis, acuminatis, basi acutis, supra nitidis, subtus leviter glaucescentibus; nervis lateralibus utrinque, 9 ad 12, tenuibus; floribus flavidis, solitariis, pedicellatis, lanceolatis, longe acuminatis, usque ad 6.5 cm longis, extus parcissime pubescentibus; fructibus ellipsoideis vel cylindraceis, circiter 12 mm longis, seminibus solitariis.

A small tree about 10 m high, glabrous except the flowers. Branches and branchlets slender, terete, dark reddish-brown when dry. Leaves oblong, chartaceous to subcoriaceous, 8 to 11 cm long, 2 to 3 cm wide, the apex acuminate, base acute, the upper surface smooth, shining, rather pale, the lower surface somewhat glaucous; lateral nerves 9 to 12 on each side of the midrib, very slender, not prominent, anastomosing, the reticulations lax; petioles 4 to 8 mm long. Flowers yellow, solitary, up to 6.5 cm long, lanceolate, acuminate, the pedicels 1 to 2 cm long, opposed to the ultimate leaf on the branchlets. Calyx about 8 mm in diameter, the lobes broadly triangular-ovate, subacute, somewhat united below, glabrous or with very few, short, scattered, ferruginous hairs. Petals lanceolate, acuminate, coriaceous, united by their margins, the corolla falling as a whole, up to 7 cm long and 1.5 cm wide, narrowed upward to the long-acuminate apex, glabrous or with very few, short, scattered, ferruginous hairs. Stamens indefinite, 1.8 mm long, crowded on the sides of the torus, the connectives broad, truncate. Carpels very many, densely arranged on the elongated torus, narrowly oblong, slightly pubescent, curved, narrowed upward, 2.5 mm long, including the curved, 1 mm long style. Ovules solitary. Fruits ellipsoid, about 12 mm long, 6 to 7 mm in diameter, dark-colored when dry, glabrous or nearly so, not at all moniliform, apex blunt; seeds conforming to the fruit in outline, solitary.

LUZON, Subprovince of Benguet, Baguio, *Merrill 9703* (type), May, 1914, in flower, *Elmer 6016*, March, 1904, in fruit, in thickets about limestone cliffs, altitude about 1,300 meters.

A species manifestly allied to *Dasymaschalon clusiflorum* Merr., from which it differs in its narrower leaves, and especially in its slenderer, long-acuminate flowers, the petals gradually narrowed upward in the upper one-half, glabrous or with but few, scattered, short, ferruginous hairs, not at all uniformly cinereous-pubescent externally as in *D. clusiflorum* Merr.

DASYMASCHALON SCANDENS sp. nov.

Frutex scandens, glaber (floribus ignotis), ramis ramulisque tenuibus teretibus; foliis oblongis, chartaceis usque ad 11 cm longis, utrinque subaequaliter angustatis, basi acutis, apice acuminatis, nitidis, supra olivaceis, subtus subglaucescentibus, nervis

utrinque circiter 12, tenuibus, primariis quam secundariis vix magis distinctis; fructibus ellipsoideis, prominente apiculatis, glabris, circiter 9 mm longis, seminibus solitariis.

A scandent shrub reaching a height of about 10 m, entirely glabrous (flowers unknown). Branches and branchlets slender, terete, smooth, dark reddish-brown when dry. Leaves oblong, chartaceous, 7 to 11 cm long, 2.5 to 4.5 cm wide, subequally narrowed to the acute base and to the acuminate apex, the upper surface dark olivaceous when dry, shining, the lower subglaucous; lateral nerves slender, not prominent, the primary ones about 12 on each side of the midrib, slender, anastomosing, scarcely more distinct than are the secondary nerves and primary reticulations; petioles 5 to 7 mm long. Flowers not seen, solitary, axillary, and terminal, opposed to the ultimate leaf, the fruiting peduncles stout, glabrous, thickened upward, up to 2 cm long, the persistent sepals thickly coriaceous, broadly ovate, glabrous, 3 to 4 mm long and wider than long, persistent. Fruits numerous, ellipsoid, about 9 mm long, prominently apiculate, brown when dry, dark purple when fresh, entirely glabrous even when very young, their pedicels 2 to 2.5 cm long. Seeds solitary, conforming to the fruit in outline but not at all apiculate.

PALAWAN, Taytay, *Merrill 9277* (type), May, 1913, on forested slopes, Taytay-Bantolan trail, altitude about 150 meters. I refer here also *Elmer 12803* from Puerto Princesa, Palawan, distributed as *Unona clusiflora* Merr.

A species quite different from *Dasymaschalon clusiflorum* Merr., especially in its habit and in its vegetative characters. It is distinguished by its leaves being smaller, thinner, dark-colored when dry, acute, never rounded at the base, and by its more numerous, much less prominent nerves, the primary ones scarcely more distinct than are the secondary ones and the reticulations.

MEIOGYNE Miquel

Meiogyne was proposed by Miquel in the year 1865[8] as a monotypic genus, based on *Unona virgata* Blume Bijdr. (1825) 14. *Meiogyne,* however, was reduced to *Unona* by Bentham & Hooker f.[9] the same year, where it has been placed by most later authors. Blume himself [10] transferred it to the genus *Uvaria,* with which, however, it has little in common. Hooker f. & Thomson [11] referred it to the genus *Cananga,* chiefly, apparently, because of its numerous 2-seriate ovules. King [12] transferred it to the genus

[8] Ann. Mus. Bot. Lugd. Bat. 2 (1865) 12.
[9] Gen. Plant. 1 (1865) 956.
[10] Fl. Jav. Anon. (1828) 43.
[11] Fl. Brit. Ind. 1 (1872) 57.
[12] Journ. As. Soc. Beng. 61[2] (1892) 28; Ann. Bot. Gard. Calcutta 4 (1893) 37.

Cyathocalyx. The species has, hence, by various authors been referred to five different genera in several distinct tribes.

In such cases as this where a single species is by various authors referred to several very different genera, it not infrequently happens that in reality a distinct generic type is represented. The most recent consideration of *Unona virgata* Blume is that by Boerlage,[13] who reinstates *Meiogyne* Miq. as a valid genus, for reasons that I consider to be entirely valid. According to Blume's first classification of the species it would fall in the tribe *Unoneae*, and to his second in the tribe *Uvarieae*. Hooker f. & Thomson retain it in the *Unoneae* as does King. Boerlage, however, removes it from the *Unoneae*, and correctly, I think, places it in the *Xylopieae*.

Unona virgata Blume has been credited to the Philippines on the basis of a specimen collected in Leyte [14] by *Cuming No. 1738*, but although a specimen of this collection has been in the herbarium of the Bureau of Science for some years, the same form has not been contained in any modern collections until recently, when it was collected by Ramos, again in Leyte. The additional material seems to show that the Philippine form is specifically distinct from the Javan one, and it is accordingly described here as a new species. The synonymy of *Meiogyne virgata* Miq. is as follows:

MEIOGYNE VIRGATA (Blume) Miq. Mus. Bot. Lugd. Bat. 2 (1865) 12; Boerl. in Ic. Bogor. 1 (1899) 123, *pl. 41*.

Unona virgata Blume Bijdr. (1825) 14; Miq. Fl. Ind. Bat. 1[2] (1858) 42.

Uvaria virgata Blume Fl. Jav. Anon. (1828) 45, t. 19, 25B.

Cananga virgata Hook. f. & Th. in Hook. f. Fl. Brit. Ind. 1 (1872) 57.

Cyathocalyx virgatus King in Journ. As. Soc. Bang. 61[2] (1892) 28, Ann. Bot. Gard. Calcutta 4 (1893) 37, pl. 44.

The species was originally described from Javan material, and is reported from Chittagong, the Malay Peninsula, Sumatra, and Borneo. From an examination of the descriptions given by various authors, and especially the figures given by Blume, King, and Boerlage, it seems doubtful whether or not all can be referred to a single species. The three figures represent forms so different in detail that it would not be surprising if, on critical examination of all available material, several distinct species were found to be represented. It is almost absolutely certain that the form figured and described by King represents a species different from that described by Blume, for Blume described the outer petals as one and one-half inches long,

[13] Ic. Bogor. 1 (1899) 123.

[14] Vidal Phan. Cuming. Philip. (1885) 92, Rev. Pl. Vasc. Filip. (1886) 41; Rolfe in Journ. Bot. 23 (1885) 210.

while King describes the flowers of his specimens as about three-fourths of an inch in length; Blume describes the carpels as from 3 to 5 in each flower, while King states that he never found more than two.

The Philippine form, which was determined by Rolfe as *Unona virgata* Blume, I consider to be specifically distinct, and its description follows:

MEIOGYNE PAUCINERVIA sp. nov.

Unona virgata Rolfe in Journ. Bot. 23 (1885) 210; Vid. Phan. Cuming. Philip. (1885) 92, Rev. Pl. Vasc. Filip. (1886) 41, non Blume.

Species M. virgatae affinis et similis, differt floribus minoribus petalis angustioribus foliisque minoribus, nervis utrinque circiter 6.

A small tree, 19 m high *fide* Ramos, the branches slender, terete, glabrous, light gray, the branchlets sparingly appressed-hirsute. Leaves lanceolate or ovate-lanceolate, usually pale when dry, shining on both surfaces, chartaceous, 6 to 12 cm long, 2 to 3.5 cm wide, the base acute, the apex slenderly and sharply acuminate, the upper surface quite glabrous, the lower sparingly appressed-hirsute along the midrib and the lateral nerves; lateral nerves about 6 on each side of the midrib, prominent on the lower surface, somewhat curved-ascending; petioles slightly pubescent, 5 to 8 mm long. Flowers greenish-yellow, usually solitary, axillary, their pedicels very short, pubescent. Sepals densely pubescent, broadly ovate, obtuse, about 4 mm long. Petals densely pubescent on both surfaces, the outer three narrowly lanceolate, about 2 cm long, 3.5 mm wide at the base, gradually narrowed upward to the long-acuminate but blunt apex; inner petals about 1.5 cm long, long subcaudate-acuminate from an oblong-ovate base which is 5 to 6 cm long and 4 to 4.5 mm wide, concave, the margins touching but not conniving, the tips of the inner petals free and more or less divergent. Anthers numerous, obovoid, about 1.5 mm long, the connectives broad, truncate, concealing the anthers. Carpels about 5, oblong-ovate, somewhat flattened, 2 mm long, pubescent; ovules about 20, in two rows. Fruit 2 to 4 on each peduncle, ellipsoid, about 6 cm long, 3.5 to 4 cm in diameter, hard and woody, externally more or less brown-pubescent.

LEYTE, in forests near Dagami, *Bur. Sci. 15381 Ramos* (type), August 23, 1912, the flowers said to be very fragrant; *Cuming 1738* (localized from Cuming's own list of localities), *Wenzel 645*. SAMAR, *Philip. Pl. 1640 Ramos.*

MEIOGYNE LUCIDA Elm. Leafl. Philip. Bot. 5 (1913) 1715.

MINDANAO, Province of Agusan, *Elmer 13984; For. Bur. 21657 Sherfesee, Cenabre, & Ponce.*

MEIOGYNE PHILIPPINENSIS Elm. Leafl. Philip. Bot. 5 (1913) 1714.

MINDANAO, District of Davao, *Elmer 11318*, distributed as a *Melodorum*.

Both of these species are closely allied to *M. paucinervia*, but differ in their shorter and broader petals. *M. lucida* is characterized by its sessile bracteolate flowers, while in *M. philippinensis* the flowers are pedicelled. The three species manifestly are closely allied.

PAPUALTHIA Diels

This genus was proposed by Diels [15] for a series of species from New Guinea, in general similar to *Polyalthia* but differing strikingly in the petals being wholly united below. The genus, as defined by Diels, is quite well represented in the Philippines, several species having been described under *Polyalthia* and one under *Unona*. The occurrence of several species of this very natural group in the Philippines, and a somewhat larger number in New Guinea, is of considerable interest from the standpoint of phytogeography. The following Philippine species are here transferred to *Papualthia:*

PAPUALTHIA LANCEOLATA (Vid.) comb. nov.

Polyalthia lanceolata Vid. Phan. Cuming. Philip. (1885) 92, 170.

LUZON, Province of Laguna, *Cuming 450* (cotype), *For. Bur. 19955, 19884 Villamil, For. Bur. 11709 Whitford, Baker 603, For Bur. 21346 Foxworthy & Catalan:* Province of Batangas, *For. Bur. 11998 Tamesis.*

PAPUALTHIA LOHERI (Merr.) comb. nov.

Polyalthia loheri Merr. in Philip. Journ. Sci. 7 (1912) Bot. 268.
Polyalthia romblonensis Elm. Leafl. Philip. Bot. 5 (1913) 1729.

This species extends from northern Luzon southward to Romblon if my reduction of *Polyalthia romblonensis* Elm. is correct, and from the material available I can see no reason for distinguishing the latter species; the specimen I have seen of *Elmer 12170*, however, presents no flowers or fruits, and additional material may show it to be really specifically distinct from *P. loheri* Merr.

PAPUALTHIA SYMPETALA (C. B. Rob.) comb. nov.

Unona sympetala C. B. Rob. in Philip. Journ. Sci. 6 (1911) Bot. 203.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 20515 Ramos:* Province of Isabela, *Bur. Sci. 7999 Ramos:* Province of Tayabas, *Bur. Sci. 13196 Foxworthy & Ramos.* ROMBLON, *Bur. Sci. 10352 McGregor* (type).

PAPUALTHIA RETICULATA (Elm.) comb. nov.

Polyalthia reticulata Elm. Leafl. Philip. Bot. 1 (1908) 292.
Polyalthia loheri Merr. var. *cagayanensis* Merr. in Philip. Journ. Sci. 7 (1912) Bot. 269.

LEYTE, *Elmer 7272* (cotype). SAMAR, *Bur. Sci. 17417 Ramos*, March, 1914. LUZON, Province of Cagayan, *Bur. Sci. 13948 Ramos:* Province of Isabela, Biocbian Bay, *Bur. Sci. 10664 McGregor.*

[15] Engl. Bot. Jahrb. 49 (1912) 138.

PAPUALTHIA URDANETENSIS (Elm.) comb. nov.

Polyalthia urdanetensis Elm. Leafl. Philip. Bot. 5 (1913) 1738.

MINDANAO, Province of Agusan, *Elmer 13931* (cotype).

This species is very closely allied to *Papualthia reticulata* and is perhaps not specifically distinct from that species. It differs in its somewhat smaller flowers, but this apparent difference may be due to the stage of development of the flowers.

PAPUALTHIA TENUIPES (Merr.) comb. nov.

Polyalthia tenuipes Merr. in Philip. Journ. Sci. 7 (1912) Bot. 269.

LUZON, Province of Tayabas, *Bur. Sci. 13472 Foxworthy & Ramos.*

Readily distinguished from all the other Philippine species by its very dissimilar petals, the inner ones much shorter than and differently shaped from the outer.

GUAMIA genus novum

Sepala 3, ovata, brevia, valvata. Petales 6, 2-seriata, valvata, crassa, pubescentia, exteriora demum patula, interiora paullo minora, angustiora, basi subexcavata, leviter conniventia. Stamina ∞, obconica, connectivo oblique subtruncato. Carpellia circiter 12, pilosa; stigmate subcapitato, glabro; ovulis numerosis. Baccae oblongae, cylindricae, leviter transverse constrictae, pilosulae. Arbor parva partibus junioribus ferrugineo-pilosis, pilis haud stellatis; foliis subaequilateralibus; floribus solitariis, breviter pedicellatis, axillaribus vel subterminalibus.

GUAMIA MARIANNAE (Safford) comb. nov.

Papualthia mariannae Safford in Journ. Wash. Acad. Sci. 2 (1912) 459, *fig. 1, 2;* Diels in Engl. Bot. Jahrb. 52 (1914) 16, *fig. 2.*

Polyalthia mariannae Merr. in Philip. Journ. Sci. 9 (1914) Bot. 83.

The type of the species was from Guam, collected by Costenoble. Additional collections are *Palomo,* cited by Safford; *Guam Experiment Station 209,* distributed from the Bureau of Science as *Orophea* n. sp., fruiting specimen; while Diels cites *Volkens 559* and a specimen collected by *Fritz* on the neighboring island of Saipan.

At the time I was studying the Guam material I stated that I could see no reason for considering the species other than as a representative of the genus *Polyalthia,* but this statement was made without due consideration of the floral characters of the plant. The perianth characters and especially the numerous ovules exclude it at once from *Polyalthia,* with which genus it apparently has little in common. My study of the species at this time is due to the fact that in examining the original material of *Unona mindorensis* Merr. its great similarity to the Guam plant at once impressed me, and as *Unona mindorensis* must probably be referred to some other genus, I tried to place it in *Papualthia* with the Guam species; it differs strikingly, however, in that the inner petals are spreading from the base, not connivent, and is scarcely congeneric with *Guamia.*

I cannot see how the species can be referred to *Papualthia* without invalidating that genus. The petals are quite free, not united at the base as in the New Guinean and Philippine representatives of that genus, while

the ovules are more numerous than in most species of the genus. Diels has remarked that the flowers are of the *Melodorum* type, and that the fruits are uvarioid, but made no attempt to place it in any genus other than *Papualthia*. Regarding the propriety of placing it in *Papualthia*, he states: "Auch mit den meisten *Papualthia* Neuguineas stimmen mehrere Merkmale nicht überein: so den freien Blumenblätter, deren äussere zuletzt sogar klaffen, so die Mehrzahl der Samenanlagen und die wenig asymmetrischen, kleinen Blätter. Immerhin kommen bei gewissen weniger bekannten Papualthien Andeutungen dieser Merkmale vor, und so mag die Art so lange bei *Papualthia* bleiben, bis uns die fortschreitende Erforschung Neuguineas erlauben wird, die Grenzen dieses Genus schärfer zu bestimmen." I am inclined to consider its proper place as very near *Oncodostigma* Diels, from which it differs essentially in its more numerous carpels, somewhat different stigma, and its slightly transversely constricted uvarioid fruits; it may not be generically distinct from *Oncodostigma*, but at any rate it is not a *Papualthia*.

POLYALTHIA Blume

POLYALTHIA RAMIFLORA sp. § *Monoon*.

Arbor circiter 12 m alta, subglabra; foliis oblongo-lanceolatis vel oblongis, nitidis, usque ad 16 cm longis, subcoriaceis, caudato-acuminatis, basi acutis, nervis utrinque circiter 12; floribus numerosis, fasciculatis, e ramis et axillis defoliatis, petalis anguste lanceolatis, glabris, 4.5 cm longis.

A tree about 12 m high, nearly glabrous. Branches terete, light gray, lenticellate, glabrous, the very tips of the growing branchlets pubescent. Leaves oblong-lanceolate or oblong, subcoriaceous, shining, when dry the upper surface rather pale, the lower a little browner in color, 8 to 16 cm long, 4 to 6 cm wide, the base acute or sometimes somewhat rounded, the apex slenderly caudate-acuminate, the acumen 1 to 1.5 cm long; lateral nerves about 12 on each side of the midrib, prominent on the lower surface, the primary reticulations slender, subparallel; petioles 5 to 7 mm long, glabrous. Flowers greenish, numerous, fascicled, the fascicles scattered along the branches below the leaves and apparently also in the axils of fallen leaves, their pedicels slender, 2 to 2.5 cm long, the small protuberances bearing the pedicels ferruginous-pubescent. Sepals broadly ovate, acute or obtuse, pubescent, about 2 mm long. Sepals subequal, narrowly lanceolate or linear-lanceolate, up to 4.5 cm long, 4 mm wide, glabrous, narrowed upward to the long-acuminate apex. Stamens many, about 1 mm long. Carpels narrowly ovoid, glabrous or slightly pubescent, with a single basal ovule; style somewhat club-shaped. Fruiting peduncles stout, about 2 cm long, the torus about 1 cm in diameter, bearing usually about 8 ellipsoid to oblong-ellipsoid, smooth, glabrous,

shining, dark brown fruits, 2 to 3 cm long, 1.2 to 1.5 cm in diameter.

LUZON, Province of Sorsogon, Sugod Bay, *For. Bur. 5160 Bridges* (type), August 6, 1906, in forests from sea level to an altitude of 75 meters: Province of Laguna, *Bur. Sci. 21989 Ramos*, October, 1913, in fruit: Province of Cagayan, *For. Bur. 20472 Barros*, July, 1913. SAMAR, *Phil. Pl. 1660 Ramos* (as *P. ramosii*).

A species well characterized by its numerous flowers which are fascicled along the branches below the leaves and by its especially narrow and long subequal petals.

POLYALTHIA ZAMBOANGAENSIS sp. nov. § *Monoon.*

Species *P. latariflorae* similis et affinis differt foliis tenuioribus, venis lateralibus obscure anastomosantibus vix evanescentibus, floribus paullo longioribus.

A tree about 10 m high, nearly glabrous. Branches terete, lenticellate, glabrous, the youngest branchlets somewhat puberulent and the terminal buds ferruginous-pubescent. Leaves oblong, chartaceous, 16 to 18 cm long, 6 to 7 cm wide, glabrous, the base rounded, the apex acuminate, shining on both surfaces, the lower a little paler than the upper; lateral nerves about 16 on each side of the midrib, prominent on the lower surface, curved upward, faintly anastomosing near the margins, the reticulations very fine, indistinct; petioles 5 to 7 mm long, glabrous. Flowers greenish-yellow, very fragrant, fascicled on the branches of the previous year below the leaves, the nodules bearing the flowers pubescent, each with about three flowers developed at one time, but with additional small buds present. Pedicels 3 to 4.5 cm long, slender, slightly pubescent, usually with an orbicular, obtuse, pubescent bracteole about 1.5 mm long at about the middle. Sepals broadly ovate or reniform, pubescent, 4 to 5 mm wide, wider than long. Petals flat, lanceolate, narrowed gradually to the acute or blunt apex, 5 to 6 cm long, 4 to 6 mm wide, slightly pubescent on the back in the lower part, the outer three a little shorter and narrower than the inner three. Stamens indefinite, about 1 mm long, connectives truncate, the torus convex, pubescent. Carpels indefinite, oblong, about 1 mm long, pubescent, with a single basal ovule.

MINDANAO, District of Zamboanga, near Margosatubig, *For. Bur. 13276 Foxworthy, DeMesa, & Villamil*, May 11, 1912, in hill forests, altitude about 120 meters. Locally known to the Moros as *malacayang lupo*.

A well-marked species but manifestly closely allied to the Malayan *Polyalthia lateriflora* King, which it greatly resembles. It is distinguishable by its thinner leaves, different venation, obscure and fine ultimate reticulations, and somewhat longer flowers.

POLYALTHIA PALAWANENSIS sp. nov. § *Monoon.*

Arbor circiter 20 m alta, subglabra; foliis oblongis, chartaceis, usque ad 15 cm longis, in siccitate pallidis, nitidis, basi rotundatis ad subacutis, apice prominente acuminatis, nervis utrinque circiter 9, tenuibus; floribus viridis, caulinis, fasciculatis, e tuberculis magnis, pedicellatis, sepalis leviter pubescentibus, petalis glabris, crasse coriaceis, oblongo-ovatis, obtusis, usque ad 3.5 cm longis; carpellis numerosis, hirsutis, 1-ovulatis.

A tree about 20 m high, glabrous except the younger parts and portions of the inflorescence. Branches slender, terete, wrinkled when dry, with small, scattered lenticels, brownish, the branchlets somewhat pubescent. Leaves oblong, chartaceous, pale and shining when dry, 11 to 15 cm long, 4 to 5 cm wide, base rounded to subacute, apex rather prominently acuminate; lateral nerves about 9 on each side of the midrib, slender, somewhat spreading, distant, anastomosing far from the margin, the reticulations slender, rather distinct; petioles about 4 mm long, glabrous. Flowers green or somewhat yellowish when mature, borne on large tubercles on the trunk, the tubercles 2 to 3 cm in diameter, very irregular, each bearing 2 to 4 flowers; pedicels pubescent, stout, about 1 cm long. Sepals broadly ovate, coriaceous, obtuse, about 3 mm long and 4 mm wide, spreading or reflexed, sparingly pubescent externally, glabrous within. Petals thickly coriaceous, glabrous, ovate to oblong-ovate, obtuse, the outer ones up to 3.5 cm long and 1.7 cm wide, the inner somewhat smaller. Stamens indefinite, crowded, about 1.6 mm long, truncate, anther-cells entirely hidden by the connectives. Carpels numerous, crowded, including the styles 1.7 mm long, the ovaries hirsute, oblong, the styles pubescent, as long as the ovaries. Ovule solitary, basal.

PALAWAN, Lake Manguao, *Merrill 9469*, April 27, 1913, on dry forested ridges, altitude about 80 meters.

A species in the group with *Polyalthia macropoda* King and allied forms, but quite different from this species and the others placed here. It has no close allies among the Philippine forms bearing the flowers on the trunk or on the larger branches.

POLYALTHIA GIGANTIFOLIA sp. nov. § *Monoon.*

Arbor circiter 20 m alta, inflorescentiis exceptis glabra; foliis oblongis, coriaceis, circiter 60 cm longis, nitidis, acuminatis, basi cordatis, nervis utrinque circiter 30, valde prominentibus; floribus 7 cm diametro, pedicellatis, plus minusve pubescentibus, in truncis fasciculatis.

A tree about 20 m high, glabrous except the inflorescence.

Branches terete. Leaves very large, about 60 cm long, 15 cm wide, oblong, coriaceous, shining on both surfaces, the base cordate, the apex acuminate; lateral nerves very prominent, about 30 on each side of the midrib; petioles very stout, black when dry, 1 to 1.5 cm long, 5 mm in diameter. Flowers numerous, yellowish-green with a disagreeable odor, fascicled on the trunk, the protuberances bearing the flowers pubescent, supplied with small pubescent bracts, the pedicels 2 to 5 cm long, pubescent, and with a pubescent, reniform, rounded bracteole, about 3 mm long, at about the lower one-third. Sepals broadly ovate, obtuse, 6 mm long, pubescent. Petals 2-seriate, subequal, thickly coriaceous, more or less pubescent on both surfaces especially when immature, oblong-lanceolate or narrowly oblong-ovate, narrowed upward to the acute or blunt apex, 3 to 3.5 cm long, 10 to 13 mm wide. Stamens very numerous, 1.5 mm long, narrowly oblong, the connectives convex-truncate. Carpels indefinite, narrowly oblong or linear oblong, glabrous, 2.5 mm long, each with a single basal ovule.

MINDANAO, District of Zamboanga, near Margosatubig, *For. Bur. 13763 Foxworthy, DeMesa, & Villamil,* May 11, 1912, in hill forests, altitude about 120 meters, locally known to the Moros as *tába.*

A very striking and characteristic species, distinguishable by its very large leaves in conjunction with its fascicled, cauline, rather large flowers.

POLYALTHIA GLANDULOSA sp. nov. § *Monoon.*

Arbor, partibus junioribus floribusque plus minusve ferrugineo-pubescentibus exceptis glabra; foliis chartaceis vel subcoriaceis, oblongis, usque ad 12 cm longis, acutis vel obscure acuminatis, basi acutis, nervis utrinque circiter 6, curvatis, distinctis, subtus in axillis glandulosis; floribus axillaribus et in axillis defoliatis, solitariis vel binis, pedicellatis, circiter 6 cm diametro, sepalis elliptico-ovatis, rotundatis, reflexis, petalis 2.5 ad 3 cm longis, subaequalis; ellipticis ad elliptico-obovatis.

A tree, glabrous or nearly so except the younger parts and the flowers which are more or less ferruginous-pubescent. Branches terete, dark gray when dry, somewhat wrinkled, glabrous, the branchlets ferruginous-pubescent. Leaves oblong, chartaceous or subcoriaceous, rather pale when dry, or the very young ones brown, 9 to 12 cm long, 3 to 4 cm wide, acute or obscurely acuminate, base acute; lateral nerves about 6 on each side of the midrib, curved-ascending, anastomosing, the axils on the lower surface distinctly glandular, often obscurely bearded; petioles 2 to 3 mm long. Flowers green, axillary and in the axils of fallen leaves, solitary or in pairs, their pedicels

about 1 cm long, cinereous- or ferruginous-pubescent. Sepals reflexed in anthesis, elliptic-ovate, rounded, ferruginous-pubescent, about 6 mm long, 5 mm wide. Petals 6, 2-seriate, subequal, spreading from the base, ferruginous-pubescent externally, 2.5 to 3 cm long, about 1.5 cm wide, the inner usually slightly larger than the outer ones, rounded at the apex, elliptic to elliptic-obovate. Stamens numerous, crowded, cuneiform, 1.2 mm long, the anther-cells obscured by the truncate connectives. Carpels numerous, crowded, narrowly oblong, pubescent, about 1 mm long, the style ellipsoid, 0.5 mm long; ovule basal, solitary.

MINDANAO, District of Zamboanga, Santa Maria, *Bur. Sci. 16460 Reillo*, October 4, 1912, near Mount Pulungbato.

A species well characterized by its leaves being glandular in the axils on the lower surface. It apparently has no very close allies in the Philippines.

POLYALTHIA GRACILIPES sp. nov. § *Monoon*.

Frutex vel arbor parva, glabra, ramis ramulisque teretibus tenuibus; foliis chartaceis vel subcoriaceis, anguste oblongis ad lanceolatis, nitidis, usque ad 20 cm longis, leviter inaequilateralibus, rectis vel obscure falcatis, longe tenuiterque acuminatis, basi subacutis, nervis utrinque circiter 12; floribus axillaribus, solitariis, longissime pedicellatis, circiter 4 cm longis, petalis 2-seriatis, obscurissime nigro-puncticulatis, in siccitate pallidis, exterioribus oblongo-ovatis ad subellipticis, 2 cm latis, interioribus circiter 1.3 cm latis.

A shrub or small tree, quite glabrous except the very slightly pubescent parts of the flowers. Branches and branchlets slender, terete, dark reddish-brown when dry. Leaves narrowly oblong to lanceolate, chartaceous to subcoriaceous, 11 to 20 cm long, 2.5 to 3 cm wide, pale olivaceous when dry, shining, straight or somewhat falcate, often distinctly inequilateral, narrowed upward to the long and slenderly acuminate apex, and below to the acute or subacute base; primary lateral nerves about 12 on each side of the midrib, slender, not prominent, straight, distant, anastomosing and forming an arched marginal nerve, the reticulations distinct; petioles about 4 mm long. Flowers solitary, axillary, the pedicels very slender, about 10 cm long. Sepals oblong-ovate to narrowly ovate, acuminate, chartaceous or subcoriaceous, glabrous or very obscurely pubescent, about 9 mm long, 6 mm wide. Petals 6, 2-seriate, pale when dry, subchartaceous, minutely black-puncticulate, glabrous or nearly so, about 4 cm long, the outer three oblong-ovate to subelliptic, obtuse, about 2 cm wide, the inner three as long as the outer ones, obtuse, about 1.3 cm wide. Stamens indefinite, crowded,

2.5 to 3 mm long, the connectives concealing the anther-cells, truncate, oblique, rounded at the tip. Carpels many, crowded, narrowly oblong, pubescent; ovule solitary, basal. Young fruit ellipsoid, black when dry, about 1 cm long.

LUZON, Province of Tayabas, Guinayangan, *Bur. Sci. 20792* (type), *20825 Escritor*, March, 1913; Quinatacutan, *Bur. Sci. 13177 Foxworthy & Ramos*, March, 1911.

A strongly marked species, at once recognizable by its large, solitary, very long pedicelled, axillary flowers. It has no close allies among the Philippine forms.

POLYALTHIA LUCIDA sp. nov. § *Monoon.*

Frutex vel arbor parva, floribus exceptis glabra; foliis oblongis ad oblongo-lanceolatis, valde nitidis, laevis, usque ad 22 cm longis, utrinque subaequaliter angustatis, apice acuminatis, basi acutis, nervis utrinque 10 ad 12, subtus prominentibus, rectis, valde anastomosantibus, reticulis laxis; floribus axillaribus, breviter pedicellatis, depresso-globosis, circiter 1 cm diametro, petalis late ovatis ad orbiculari-ovatis, valde incrassatis, carnosis, incurvis, liberis, interioribus quam exterioribus distincte majoribus; carpellis numerosis, ovulis solitariis.

A shrub or small tree 4 to 6 m high, quite glabrous except parts of the flowers, or the growing tips of the branchlets sometimes sparingly pubescent. Branches and branchlets terete, smooth, dark reddish-brown, somewhat shining. Leaves oblong to oblong-lanceolate, chartaceous, 12 to 22 cm long, 3.5 to 6 cm wide, smooth, both surfaces strongly shining, subequally narrowed to the acute base and to the rather sharply acuminate apex, the margins distinctly recurved; lateral nerves slender, straight, prominent on the lower surface, distant, 10 to 12 on each side of the midrib, prominently anastomosing with the arcuate marginal nerves 5 to 8 mm from the edge of the leaf, the marginal nerves about as prominent as the lateral ones, the reticulations lax; petioles about 8 mm long. Flowers greenish-yellow, depressed-globose, about 1 cm in diameter, axillary, solitary, the pedicels 5 mm long or less, obscurely pubescent, bracteolate at the base. Sepals valvate, very thickly coriaceous, reniform, rounded, about 2 mm long and 2 mm wide, externally slightly pubescent. Petals 6, 2-seriate, very thick and fleshy, strongly incurved, valvate, quite free, sparingly pubescent, bases broad, the inner three distinctly larger than the outer ones; outer petals broadly ovate, about 6 mm long and 5 mm wide, rounded or obtuse, the inner three thicker, up to 2 mm in thickness, 6 to 7 mm in diameter, rounded, suborbicular-ovate. Stamens many, closely packed, 1.8 mm long, the anther-cells lateral,

concealed by the short, truncate connectives. Carpels about 30, crowded, oblong, pubescent, 1 to 1.2 mm long, the stigma sessile, truncate, broad, obscurely cleft; ovule solitary, basal. Torus flat. Fruit ellipsoid, about 2 cm long, rounded, the pericarp somewhat wrinkled when dry, thin, glabrous; seed solitary, very hard when dry, about 1 cm long, ruminate, the pedicels in fruit 2.5 to 3 cm long.

LUZON, Province of Tayabas, Tagcauayan, *Bur. Sci. 13338 Ramos* (type), March 15, 1911, in forests, altitude about 100 m; Mount Pular, *Bur. Sci. 19416 Ramos*, January, 1913, in fruit. MINDANAO, District of Zamboanga, *For. Bur. 9008, 9400 Whitford & Hutchinson.*

The species is anomalous in *Polyalthia* in its short, very thick, incurved petals, which are, however, entirely free, valvate, not at all arched over the stamens although incurved, and its sessile truncate stigmas. The flowers at anthesis are depressed-globose and about 1 cm in diameter, although the petals at all stages are entirely free. It perhaps belongs in the alliance with *Polyalthia persicaefolia* Benth. & Hook. f.

POLYALTHIA AGUSANENSIS (Elm.) comb. nov.

Unona agusanensis Elm. Leafl. Philip. Bot. 5 (1913) 1743.

MINDANAO, Province of Agusan, Mount Urdaneta, *Elmer 13654*, type number.

This species is not a *Unona* (*Desmos*), but belongs in the section *Monoon* of *Polyalthia*, its carpels having a single basal ovule. It is very similar and very closely allied to *Polyalthia cumingiana* Merr., and a series of specimens may show the two to be identical. *Polyalthia agusanensis* differs from *P. cumingiana* in its distinctly broader petals and in its rather more numerously nerved leaves. The original description of Elmer's species is faulty as to the length of the outer petals being indicated as 4 mm when manifestly 4 cm was intended. The type number is *13654*, not *3654* as cited.

POLYALTHIA GRANDIFOLIA Elm. Leafl. Philip. Bot. 1 (1908) 291.

Polyalthia pinnatinervia Elm. Leafl. Philip. Bot. 5 (1913) 1736.

The type of *Polyalthia grandifolia* Elm. is *Elmer 7358*, from Leyte, a specimen with very immature fruits; the type of *P. pinnatinervia* Elm. is *Elmer 13611*, from Agusan, Mindanao, a specimen with flowers. While the specimens are not directly comparable in all characters, one being with young fruits and the other with flowers, I can detect no specific differences, and am confident that but a single species is represented.

POLYALTHIA MERRITTII (Merr.) comb. nov. § *Eupolyalthia.*

Unona merrittii Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 190.

This species is apparently a *Polyalthia* rather than a *Unona*, and seems to be closely allied to the Malayan *Polyalthia glauca* (Hassk.) Boerl. in Ic. Bogor. 1 (1899) 104. It is represented by the following specimens: LUZON, Province of Tayabas (Principe), *Merrill 1031:* Province of Camarines, *For. Bur. 10475 Curran.* MINDORO, *Whitford 1447, For. Bur. 3712 Merritt.*

SIBUYAN, *Elmer 12449*. MINDANAO, Butuan Subprovince, *For. Bur. 20757 Ponce, Miranda, & Rafael.*

MITREPHORA Hook. f. & Thomson

MITREPHORA BASILANENSIS sp. nov.

Arbor circiter 15 m alta, partibus junioribus inflorescentiis floribusque prominente ferrugineo-pubescentibus; foliis oblongo-lanceolatis ad lanceolatis, sursum gradatim angustatis, acuminatis, basi subacutis, chartaceis, usque ad 12 cm longis, in siccitate pallide griseis, nitidis, nervis utrinque circiter 7, tenuibus, adscendento-curvatis; inflorescentiis axillaribus, depauperato-cymosis, paucifloris; petalis exterioribus oblongis, circiter 11 mm longis, interioribus unguiculatis, arcuatis, extus hirsutis; carpellis paucis, hirsutis.

A tree about 15 m high, the younger parts and the inflorescence prominently ferruginous-pubescent. Branches slender, terete, grayish-brown, wrinkled, glabrous, the younger ones ferruginous-pubescent. Leaves oblong-lanceolate to lanceolate, firmly chartaceous, pale grayish and prominently shining when dry, 8 to 12 cm long, 2 to 3.5 cm wide, gradually narrowed upward to the rather sharply acuminate apex, the base subacute, the lower surface with very few appressed hairs on the midrib and lateral nerves; nerves about 7 on each side of the midrib, slender, not prominent, curved-ascending, very obscurely anastomosing, the reticulations nearly obsolete; petioles 2 to 3 mm long. Inflorescence of depauperate, few-flowered, ferruginous-pubescent cymes in the uppermost axils, but one flower opening at a time, the rachis 1.5 cm long or less; pedicels about 5 mm long. Sepals broadly ovate, coriaceous, acute or broadly acuminate, about 3 mm long and wide, ferruginous-pubescent. Outer three petals spreading, oblong, about 11 mm long, 5 mm wide, acute or obscurely acuminate, pubescent; inner three petals clawed, arcuate, about 9 mm long, the claw about 5 mm in length, the limb subrhomboid, about 5 mm wide, the angles rather sharp, externally densely hirsute. Stamens indefinite, closely crowded, 1 mm long, the truncate connectives concealing the anther-cells. Carpels about 6, crowded, densely pubescent, about 1.3 mm long; ovules about 4; stigma glabrous, oblique.

BASILAN, *For. Bur. 20060 Miranda,* October 4, 1912, not far from the mangrove swamp, near the Barrio of Balobato, altitude about 10 meters.

This species somewhat resembles *Mitrephora ellipanthoides* Elm., the flowers of which are unknown, and which may prove to be not a *Mitrephora.* The present species is readily distinguished by its differently shaped leaves

and its prominent ferruginous indumentum on the younger branchlets and the inflorescence.

MITREPHORA FRAGRANS sp. nov.

Arbor 8 ad 10 m alta, partibus junioribus dense ferrugineo-pubescentibus; foliis coriaceis, oblongo-ovatis ad elliptico-ovatis, usque ad 26 cm longis, junioribus utrinque ad costa nervisque plus minusve ferrugineo-pubescentibus, vetustioribus glabrescentibus, obtusis vel obtuse acuminatis, basi subacutis ad subrotundatis, nervis utrinque 13 ad 16, valde prominentibus; floribus paucis, usque ad 11 cm diametro, petalis exterioribus accrescentibus; carpellis circiter 10; ovulis 16 ad 20.

A tree 8 to 10 m high, the branchlets, young petioles, pedicels and buds densely ferruginous-pubescent. The branches terete, nearly black when dry, more or less ferruginous-pubescent, becoming glabrous. Leaves coriaceous, pale when dry, slightly shining, oblong-ovate to elliptic-ovate, 10 to 26 cm long, 5 to 11 cm wide, apex obtuse to obtusely acuminate, base subacute to subrounded, both surfaces more or less ferruginous-pubescent on the midrib and lateral nerves, in age becoming glabrous or nearly so; lateral nerves 13 to 16 on each side of the midrib, very prominent. Flowers perfect, fragrant, opening pale yellowish-white, turning bright orange-yellow, extra-axillary, solitary, their pedicels 1 cm long or less, with 2 or 3 subverticillate, broadly ovate, coriaceous, ferruginous-pubescent, about 7 mm long bracteoles near the apex. Sepals broadly ovate to oblong-ovate, 10 to 14 mm long, obtuse, more or less ferruginous-pubescent. Outer petals 3 cm long at anthesis, accrescent and soon 5.5 cm long and up to 4 cm wide, oblong-ovate to obovate, acuminate, base narrowed, outside rather densely pubescent, inside sparingly so; inner petals vaulted, deciduous, nearly 3 cm long, the claw slender, 1.5 cm long, the limb subrhomboid, obtuse, about 12 mm wide, externally slightly pubescent, internally hirsute. Stamens very numerous, crowded, 1.5 mm long, connectives broad, truncate, slightly oblique. Carpels about 10, crowded, densely pubescent, narrowly oblong, narrowed upward, about 1.8 mm long; ovules 16 to 20, 2-seriate.

PALAWAN, Taytay, *Merrill 9217*, April, 1913, on forested slopes of a small valley, altitude about 40 meters.

The flowers open, pale yellowish-white, the external petals then being about 3 cm long; the inner three arched petals are marked with purple, and are early deciduous, but the external petals persist for some time, are accrescent, and gradually turn bright orange-yellow. The species is well characterized by its unusually large flowers, and although its vegetative characters resemble those of *Mitrephora williamsii* C. B. Rob., the two species are not at all closely allied.

MITREPHORA SAMARENSIS sp. nov.

Arbor 10 ad 12 m alta, partibus junioribus inflorescentiisque ferrugineo-pubescentibus; foliis ovato-ellipticis ad oblong-ovatis, subcoriaceis, usque ad 10 cm longis, acuminatis, basi subacutis ad subrotundatis, nitidis, nervis utrinque 6 vel 7, subtus prominentibus; racemis paucifloris, floribus usque ad 3 cm diametro, petalis exterioribus elliptico-ovatis, undulatis, extus pubescentibus, intus glabris, interioribus arcuatis, circiter 12 mm longis, acuminatis, intus dense hirsutis; carpellis circiter 12, hirsutis.

A tree 10 to 12 m high, the younger parts and the inflorescences rather prominently ferruginous-pubescent. Branches terete, glabrous, nearly black when dry. Leaves subcoriaceous, ovate-elliptic to oblong-ovate, rather pale when dry, shining on both surfaces, glabrous or the midribs slightly pubescent, at least when young, 6 to 10 cm long, 2 to 4 cm wide, base subacute to subrounded, apex distinctly acuminate; lateral nerves 6 or 7 on each side of the midrib, when young somewhat pubescent on the lower surface, curved, prominent, looped-anastomosing; petioles about 5 mm long. Racemes short, on the ultimate branchlets, mostly leaf-opposed, the rachis 1 cm long or less, densely ferruginous-pubescent as are the pedicels and sepals, each raceme producing but one or two flowers at a time, the pedicels 1 to 1.5 cm long. Sepals broadly ovate, coriaceous, somewhat acuminate, 2.5 to 3 mm in diameter. Outer petals elliptic-ovate, acuminate, base somewhat narrowed, up to 1.6 cm long and 11 mm wide, outside pubescent, prominently undulate, inside glabrous, pale yellow to buff-yellow with blotches of red, inside deep orange; inner petals about 12 mm long, vaulted, pubescent externally, the claw 6 to 7 mm long, the limb broadly ovate, somewhat acuminate, basal angles rounded, about 5 mm long and wide, inside densely hirsute. Stamens indefinite, closely packed, about 1 mm long, the truncate connectives concealing the anther-cells. Carpels about 12, oblong, hirsute, narrowed upward, about 1 mm long, the styles oblong-obovate, glabrous, as long as the ovaries; ovules about 4.

SAMAR, Cauayan Valley, *Phil. Pl. 1666 Ramos* (type), April, 1914. BILIRAN, *Bur. Sci. 18550 McGregor*, June, 1914, in forests, altitude about 300 m.

A species manifestly very closely allied to *Mitrephora maingayi* Hook. f. & Th., but with much smaller, fewer nerved leaves. King figures the external petals of *M. maingayi* as prominently pubescent inside, while in the present species they are quite glabrous internally. This may be the same as *Mitrephora pictiflora* Elm., of which I have seen no specimens, but it differs in many details from the description of that species, notably in its somewhat smaller leaves, and smaller flowers, the outer petals quite glabrous inside, not strigose.

PSEUDUVARIA Miquel

The genus *Pseuduvaria* was proposed by Miquel [16] for the species described by Blume as *Uvaria reticulata*, which is, therefore, the type of the genus *Pseuduvaria*. The section *Mitrephora* of *Uvaria* as characterized by Blume [17] is typified by *Mitrephora obtusa* (Blume) Hook. f. & Th., a species with perfect flowers. Miquel's genus *Pseuduvaria* was reduced by Bentham & Hooker f. to *Mitrephora*, and all authors who have recently considered the Indian and Malayan species of *Anonaceae* [18] have followed Bentham & Hooker f. in their treatment of Miquel's genus, although all consider species that properly fall in *Pseuduvaria*, whether this be considered as a valid genus or merely as a section of *Mitrephora*. As genera are now characterized in the *Anonaceae*, I consider that *Pseuduvaria* is sufficiently distinct from *Mitrephora* to be recognized as a valid genus; it is certainly more strongly differentiated from *Mitrephora*, and *Orophea*, the allied genera, than are several other generally recognized genera of the family.

The section *Para-Orophea* Boerl.[19] is the same as the genus *Pseuduvaria* Miq., at least as to most of the species placed here by Boerlage, and the first species cited. In proposing the section Boerlage states: "Les espèces de cette section se rapprochent d'*Orophea* par les dimensions de le fleur et la grandeur relative des pétales, mais les étamines quoique moins nombreuses sont analogues à celles des *Mitrephora*. M. King en rapportant au genre *Mitrephora* l'espèce décrite comme *Orophea reticulata* par Miquel fait prévaloir le caractère des étamines; je l'ai imité pour éviter de nouveaux changements dans la délimitation des genres." As *Pseuduvaria* (*Para-Orophea*) is intermediate between *Mitrephora* and *Orophea*, and is apparently distinguished from both by constant characters, it appears logical to recognize the group as a valid genus. I accordingly refer to *Pseuduvaria* the following species:

PSEUDUVARIA RETICULATA (Blume) Miq. F. Ind. Bat. 1 [2] (1858) 33.

Uvaria reticulata Blume Fl. Jav. Anon. (1828–36) 50, *t. 24*.

Mitrephora reticulata Hook. f. & Th. in Hook. f. Fl. Brit. Ind. 1 (1872)

[16] Fl. Ind. Bat. 1 [2] (1858) 32.

[17] Fl. Jav. Anonaceae 32, *t. 10*, *t. 14 C*.

[18] King, G. The Anonaceae of British India. *Ann. Bot. Gard. Calcutta* 4 (1893) 1–169, *t. 1–220;* Boerlage, J. G. Notes sur les Anonacées du Jardin Botanique de Buitenzorg. *Ic.* Bogor. 1 (1899) 79–156, *t. 26–75*; Diels, L. Die Anonaceen von Papuasien. *Engl. Bot. Jahrb.* 49 (1912) 113–167.

[19] Ic. Bogor. 1 (1899) 138.

77; King in Ann. Bot. Gard. Calcutta 4 (1893) 113, *t. 156A*; Boerl. in Ic. Bogor. 1 (1899) 139.

Orophea reticulata Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 23.

The known range of the species is Burma, Perak, Malacca, Java, and Noesa Kambangan. I have seen the following specimens: Perak, *Ridley 14599;* Java, cult. Buitenz., *IV, H, 104;* Noesa Kambangan, *Native collector 247.*

This species is the type of the genus *Pseuduvaria* Miquel.

PSEUDUVARIA DIEPENHORSTII Teysm. & Binn. in Nat. Tijdschr. Nederl. Ind. 27 (1864) 38.

Mitrephora diepenhorstii Teysm. & Binn. Cat. Hot. Bogor. (1856) 175; Boerl. in Ic. Bogor. 1 (1899) 139, *t. 47.*

Orophea diepenhorstii Scheff. in Flora 52 (1869) 302.

Sumatra; Java, cult. in Hort. Bogor. *IV, H, 54!*

PSEUDUVARIA GLANDULIFERA (Boerl.) comb. nov.

Mitrephora glandulifera Boerl. in Ic. Bogor. 1 (1899) 139, 175, *t. 60.*

Origin unknown, but probably from some part of the Malay Archipelago; cultivated in the Botanical Garden at Buitenzorg *IV, H, 34!*

PSEUDUVARIA RUGOSA (Blume) comb. nov.

Uvaria rugosa Blume Bijdr. (1825) 12; Fl. Jav. Anon. 47, *t. 22.*

Orophea rugosa Miq. Fl. Ind. Bat. 1 [2] (1858) 26.

Mitrephora rugosa Boerl. in Ic. Bogor. 1 (1899) 140.

Java; cult. in hort. bot. Bogor. *IV, G, 95, 95a!*

PSEUDUVARIA MACROPHYLLA (Oliver) comb. nov.

Mitrephora macrophylla Oliver in Hook. Ic. 16 (1887) *t. 1582;* King in Ann. Bot. Gard. Calcutta 4 (1893) 114, *t. 157!*

Penang, Perak, *Ridley 14600, 14601!*

PSEUDUVARIA PRAINII (King) comb. nov.

Mitrephora prainii King in Journ. As. Soc. Beng. 61 [2] (1892) 88, Ann. Bot. Gard. Calcutta 4 (1893) 115, *t. 158.*

Andaman Islands.

PSEUDUVARIA AURANTIACA (Miq.) comb. nov.

Orophea aurantiaca Miq. Ann. Mus. Bot. Lugd.-Bat. 2 (1865) 25.

Borneo.

PSEUDUVARIA VERSTEEGII (Diels) comb. nov.

Mitrephora versteegii Diels in Engl. Bot. Jahrb. 49 (1912) 154.

New Guinea.

To this genus are probably to be referred the following species: *Mitrephora grandifolia* Diels (*Stelechocarpus grandifolia* Warb), of New Guinea; *Orophea trachycarpa* Miq., of Sumatra (possibly identical with *Pseuduvaria diepenhorstii* T. & B.); *Orophea sumatra* Miq., of Sumatra; *Mitrephora* (*?*) *parallelivenia* Boerl., of Borneo (fruits and flowers unknown); *Mitrephora aperta* T. & B., of Java [perhaps identical with *Pseuduvaria reticulata* (Bl.) Miq.]; *Mitrephora chrysocarpa* Boerl., of Borneo; *M.* (*?*) *ovata* Boerl., of New Guinea; and *M.* (*?*) *rupestris* Boerl., of Celebes

(flowers unknown, but from Boerlage's figure apparently in the group with *Pseuduvaria diepenhorstii* Miq.).

PSEUDUVARIA PHILIPPINENSIS sp. nov.

Arbor dioeca, 10 ad 15 m alta, plus minusve molliter pubescentibus; foliis oblongis ad oblongo-lanceolatis, chartaceis ad subcoriaceis, usque ad 16 cm longis, acuminatis, basi acutis, supra, costa exceptis, glabris, nitidis, subtus pallidis, molliter pubescentibus, nervis utrinque circiter 10, prominentibus; floribus ♂ numerosis, axillaribus, fasciculatis, longe pedicellatis, pubescentibus, petalis exterioribus ovatis, quam sepalis paullo majoribus, interioribus valde diversis, longe unguiculatis, circiter 6 mm longis; staminibus circiter 50, uvarioideis.

A tree 10 to 15 m high, diœcious, more or less softly pubescent. Branches terete, dark-colored when dry, more or less wrinkled, glabrous, the young branchlets rather densely and softly pubescent with pale or subferruginous hairs. Leaves chartaceous to subcoriaceous, rather pale when dry, shining, oblong to oblong-lanceolate, 9 to 16 cm long, 3 to 4.5 cm wide, base acute, the apex rather prominently acuminate, the upper surface brownish-olivaceous or rather pale, glabrous except the more or less pubescent midrib, the lower surface much paler than the upper, rather softly pubescent with grayish hairs; lateral nerves about 10 on each side of the midrib, prominent, curved-ascending, anastomosing, the reticulations lax, distinct; petioles about 3 mm long, pubescent, ultimately subglabrous. Male flowers numerous, axillary and in the axils of fallen leaves, yellow, 2 to 10 in a fascicle, their pedicels about 1.5 cm long, densely pubescent, the buds depressed-globose. Sepals 3, broadly ovate, obtuse, densely pubescent, about 1.5 mm long. Outer 3 petals quite similar to the sepals but 2 mm long; inner 3 petals entirely different from the outer, clawed, arched, about 6 mm long, pubescent, coriaceous, the claw slender below, widened above, about 4 mm long, the limb 3.5 to 4 mm wide, cohering by the lateral margins leaving an opening in the center above the stamens. Stamens about 50, uvarioid, densely crowded on the pubescent torus, about 0.7 mm long, truncate, the anther-cells concealed by the connectives. Pistillate flowers not seen.

LUZON, Province of Tayabas, Hinabaan, *For. Bur. 20182 Aguilar* (type) April 22, 1913: Province of Cagayan, Claveria, *For. Bur. 12987 Bernardo.* Probably referable here is *Merrill 9213* from Palawan, the specimen in fruit.

The alliance of this species is with the Sumatran *Pseuduvaria diepenhorstii* T. & B., which it greatly resembles. It is distinguished, however, by its indumentum and its fewer nerved leaves.

OROPHEA Blume

OROPHEA AVERSA (Elm.) comb. nov.

Mitrephora aversa Elm. Leafl. Philip. Bot. 5 (1913) 1719.

MINDANAO, Province of Agusan, Mount Urdaneta, *Elmer 13985*, October, 1912, type number.

This species is in all respects an *Orophea*, not a *Mitrephora*. Its inner petals are longer than the outer, and its stamens are miliusioid. Elmer has described the flowers as pistillate, but in the younger ones the stamens are present, stout, glabrous, about 1 mm long, few in number (apparently about 6), the cells not obscured by the overlapping connectives. The carpels are about 6 in number, about 1 mm long (not 1 dm long as described), each with 2 or 3 ovules.

OROPHEA POLYANTHA sp. nov.

Arbor parva, ramulis foliis subtus ad costa nervisque inflorescentiisque ferrugineo-pubescentibus; foliis chartaceis, in siccitate brunneis, oblongis ad elliptico-ovatis, usque ad 13 cm longis, basi acutis, apice acuminatis, nervis utrinque 7 vel 8, curvato-adscendentibus; inflorescentiis numerosis, extra-axillaribus, depauperato-cymosis, 1.5 ad 2 cm longis; floribus numerosis, sepalis late ovatis, 3 mm longis, obtusis petalis exterioribus circiter 5 mm longis, patulis vel reflexis, late ovatis, interioribus unguiculatis, circiter 7 mm longis, arcuatis; staminibus circiter 6, miliusioideis; carpellis circiter 6, pubescentibus.

A small tree, the branchlets, leaves on the midrib and lateral nerves beneath, and the inflorescence rather prominently ferruginous-pubescent. Branches slender, terete, glabrous, very dark brown or nearly black when dry. Leaves chartaceous, brownish when dry, oblong to elliptic-ovate, 7 to 13 cm long, 3 to 5 cm wide, the upper surface somewhat pubescent when young, in age quite glabrous, the lower surface ferruginous-pubescent on the midrib and lateral nerves; lateral nerves 7 or 8 on each side of the midrib, slender, prominent, curved-ascending; petioles 2 to 3 mm long. Cymes depauperate, extra-axillary, among the leaves and on the branchlets below the leaves, numerous, solitary, the rachis 5 mm long or less, with numerous small bracts. Flowers few in each inflorescence, but 1 or 2 opening at the same time, their pedicels about 1 cm long, thickened upward, ferruginous-pubescent, with an oblong, 2 mm long bracteole at the lower one-third. Sepals pubescent, spreading, broadly ovate, obtuse, about 3 mm long. Outer 3 petals similar to the sepals but larger, about 5 mm long, spreading or reflexed, obtuse; inner 3 petals clawed, arcuate, thick, pubescent, about 7 mm long, the limb subrhomboid, coarsely acuminate-rostrate, about 3 mm long and 2.5 to 3 mm wide. Stamens about

6, miliusioid, about 1 mm long. Carpels about 6, inequilaterally ovoid, about 1.2 mm long, densely pubescent, crowded, the ovules 4.

SAMAR, Cauayan Valley, *Phil. Pl. 1673 Ramos*, April, 1914, in forests near small streams.

There are several Philippine species from which this one is not strongly differentiated. It is apparently most closely allied to *Orophea bracteolata* Merr., from which it differs in its very much smaller bracteoles, fewer nerved leaves, fewer stamens, and much fewer carpels.

OROPHEA TARROSAE sp. nov.

Arbor parva, circiter 6 m alta, subtus foliis ad nervos petiolis ramulis inflorescentiisque plus minusve pubescentibus; foliis oblongis, chartaceis, in siccitate pallidis, usque ad 16 cm longis, brevissime obtuse acuminatis, basi acutis vel subrotundatis, nervis utrinque 10, subtus prominentibus; racemis brevibus, extra-axillaribus; floribus 2 vel 3, petalis exterioribus 6 mm longis; staminibus 6.

A small tree, about 6 m high, the branches slender, terete, black or nearly so when dry, glabrous, the branchlets distinctly ferruginous-pubescent. Leaves oblong, chartaceous, rather pale when dry, of about the same color on both surfaces, shining, 10 to 16 cm long, 5 to 7 cm wide, the apex very shortly and bluntly acuminate, base acute or somewhat rounded, the upper surface glabrous, the lower sparingly pubescent on the midrib and nerves; lateral nerves 10 on each side of the midrib, prominent, distinctly looped-anastomosing; petioles very short, 3 mm long, pubescent. Racemes extra-axillary, short, pubescent, solitary, few-flowered, their rachises 1.5 cm long or less, usually producing two flowers at a time. Pedicels slender, 8 to 10 mm long, pubescent, with an ovate, acuminate, about 2 mm long, pubescent bracteole at about the middle or below. Sepals ovate, pubescent, acuminate, 3 mm long. Outer 3 petals ovate, obtuse, about 6 mm long, 4.5 mm wide, pubescent on both surfaces, distinctly nerved. Inner three petals arcuate, 8 mm long, the claw glabrous, 4 mm long, the limb thick, somewhat triangular, acute, pubescent on the back, glabrous within, about 5 mm wide. Stamens 12, 2-seriate. Carpels 6, narrowly ovoid, pubescent, somewhat curved, 2 mm long, each containing 5 ovules arranged in a single row.

MINDANAO, District of Cotabato, *For. Bur. 14927 Tarrosa & Almagro*, April 20, 1912, in dipterocarp forests, altitude about 40 meters. The flowers are said to be yellow and fragrant.

A species characterized among the Philippine forms by its comparatively large leaves which are very shortly and bluntly acuminate.

OROPHEA WILLIAMSII sp. nov.

Arbor parva, plus minusve pubescentibus; foliis oblongis, chartaceis, usque ad 17 cm longis, in siccitate supra pallidis, nitidis, apice distincte acuminatis, basi acutis vel subrotundatis, nervis utrinque circiter 10, subtus prominentibus; floribus in fasiculis vel in umbellis breviter pedunculatis extra-axillaribus dispositis, pedicellis 1.5 ad 2 cm longis; petalis exterioribus ovatis, 8 mm longis; staminibus 12.

A small tree, about 4 m high. Branches terete, slender, dark-colored when dry, glabrous, the branchlets ferruginous-pubescent. Leaves oblong, chartaceous, 11 to 17 cm long, 4 to 6 cm wide, the upper surface glabrous, pale and shining when dry, the lower somewhat brownish, duller, distinctly pubescent on the midrib and to a less degree on the lateral nerves, the base acute or somewhat rounded, the apex narrowed into a distinct, blunt acumen about 1 cm in length; lateral nerves about 10 on each side of the midrib, prominent on the lower surface, somewhat curved-ascending, distinctly anastomosing, the reticulations fine, subparallel, not prominent; petioles pubescent, 3 to 5 mm long. Flowers yellowish, in extra-axillary fascicles or in shortly peduncled umbels, 2 to 6 flowers in each. Pedicels prominently pubescent, 1.5 to 2 cm long, subtended by basal, lanceolate, acuminate, 3.5 mm long bracts, each bearing a similar bracteole at about the lower one-third. Sepals broadly ovate, acuminate, pubescent, 4 mm long. Outer three petals broadly ovate, pubescent, acute or obtuse, 8 mm long, 5 mm wide, nerved, the inner three of about the same length, the claw glabrous, 3 mm long, bearing an orbicular-reniform rounded limb which is pubescent on the back and glabrous on the inner face and distinctly horizontally sulcate or somewhat cucullate. Stamens 12, in two series, 1 to 1.2 mm long. Carpels about 5, densely pubescent, narrowly ovoid, 2 mm long, somewhat curved, each with about 6 ovules, apparently borne in two rows.

MINDANAO, District of Zamboanga, Sax River, *R. S. Williams 2311*, February 26, 1905, in forests, altitude about 200 meters.

A species manifestly allied to *Orophea villamilii* Merr., but with differently shaped, rather prominently acuminate leaves, more numerous, longer pedicelled flowers, and entirely differently shaped inner petals which are glabrous within and horizontally sulcate or cucullate.

OXYMITRA Hook. f. & Thomson

OXYMITRA BAKERI sp. nov.

Frutex scandens, partibus junioribus infructescentibus exceptis glaber vel subglaber; foliis anguste lanceolatis, usque ad 25 cm

longis, 1.5 ad 2.5 cm latis, sursum sensim angustatis, acutis vel leviter acuminatis, basi rotundatis cordatisque, subtus glaucescentibus, nervis utrinque circiter 25; pedunculis axillaribus, tenuibus, circiter 3.5 cm longis; fructibus ellipsoideis, glabris, circiter 8 mm longis, obtuse apiculatis.

A scandent shrub, nearly glabrous except the younger parts, the infructescence, and the flowers. Branches terete, slender, glabrous, nearly black when dry, about 2.5 mm in diameter or less, the branchlets slenderer and somewhat ferruginous-pubescent. Leaves narrowly lanceolate, 15 to 24 cm long, 1.5 to 5 cm wide, subcoriaceous, gradually narrowed upward to the acute or somewhat acuminate apex, the base rather broadly and abruptly rounded and distinctly cordate, the upper surface smooth, shining, the lower glaucous, pubescent with very few scattered hairs, ultimately quite glabrous; lateral nerves about 25 on each side of the midrib, distinct, the reticulations lax, not parallel; petioles 2 to 3 mm long, glabrous or nearly so. Flowers not seen. Fruiting peduncles axillary, solitary, slender, up to 3.5 cm long, glabrous. Fruits numerous, glabrous, ellipsoid, about 8 mm long, reddish-brown when dry, blunt-apiculate, their pedicels pubescent, about 1 cm long.

LUZON, Province of Laguna, hills back of Paete, *C. F. Baker 3691* (type), December 28, 1914: Province of Albay, Calanaga, *Bur. Sci. 6290 Robinson*, August, 1908, sterile specimen.

A very characteristic species, at once recognizable by its very narrow, greatly elongated leaves.

OXYMITRA LANCEOLATA sp. nov.

Frutex scandens; foliis lanceolatis, coriaceis, acuminatis, usque ad 12 cm longis, basi obtusis vel subacutis, distincte biglandulosis, supra glabris, nitidis, vel junioribus plus minusve pubescentibus, subtus brunneis, pubescentibus, nervis utrinque circiter 10; floribus solitariis, breviter pedicellatis, 3.5 cm longis, petalis sulcatis; carpellis 1-ovulatis.

A scandent shrub, the branches terete, glabrous, dark-colored when dry, the younger branchlets, petioles, pedicels, flowers, and lower surfaces of the leaves rather densely and uniformly pubescent with short, brown or ferruginous hairs. Leaves lanceolate, coriaceous, 8 to 12 cm long, 2 to 3 cm wide, narrowed upward to the acuminate apex, the base subacute, obtuse, or sometimes nearly rounded with two small glands on the upper surface at the junction of the petiole, when young somewhat pubescent on the upper surface, when mature quite glabrous, dark brown, shining, the lower surface paler; lateral nerves about 10 on each side of the midrib, very prominent, ascending; petioles about 2

mm long. Flowers green and pink, on the ultimate branchlets opposite the terminal leaves. Calyx pubescent, the sepals broadly ovate, obtuse, coriaceous, about 3 mm long. Outer three petals narrowly lanceolate, coriaceous, about 3.5 cm long, 8 mm wide, longitudinally sulcate, uniformly brown-pubescent, narrowed upward to the blunt apex, the base slightly concave; inner three petals narrowly ovate, glabrous, thickly coriaceous, 6 to 7 mm long, deeply concave, prominently and sharply acuminate. Stamens many, about 1 mm long, the connectives truncate. Carpels many, narrowly oblong, somewhat curved, 1.2 to 1.4 mm long, narrowed upward, about 1.2 mm long; stigmas of the outer carpels narrowly oblong, up to 1 mm long, of the inner ones irregularly obovoid, truncate, shorter; ovules solitary.

LEYTE, near Dagami, in forests, *Bur. Sci. 15342 Ramos*, August, 1912.

A species manifestly allied to *Oxymitra biglandulosa* (Blume) Scheff., but with very differently shaped leaves, more numerous nerves, and somewhat longer flowers. It differs from *O. urdanatensis* Elm. notably in its more numerously nerved leaves.

OXYMITRA PHILIPPINENSIS sp. nov.

Frutex scandens, partibus junioribus ferrugineo-pubescentibus; foliis subcoriaceis, oblongis ad oblongo-ellipticis, usque ad 25 cm longis, apice rotundatis, basi cordatis, supra glabris, nitidis, subtus glaucis, ad costa nervisque ferrugineo-pubescentibus, nervis utrinque 16 ad 18; floribus extra-axillaribus, solitariis, longe pedicellatis, circiter 5.5 cm longis, ferrugineo-pubescentibus, petalis exterioribus concavis, interioribus glabris vel subglabris, circiter 9 mm longis, carpellis dense hirsutis.

A scandent shrub, the younger leaves, twigs, and flowers rather densely ferruginous-pubescent. Branches terete, brown, slender, more or less ferruginous-pubescent. Leaves oblong to oblong-elliptic, subcoriaceous, 17 to 25 cm long, 7.5 to 11 cm wide, apex broadly rounded, base equilateral or somewhat inequilateral, cordate, scarcely narrowed, the upper surface brown and shining when dry, glabrous, or the midrib slightly pubescent, the lower surface glaucous, the midrib and nerves dark brown, ferruginous-pubescent; lateral nerves 16 to 18 on each side of the midrib, prominent; petioles stout, 8 mm long or less, ferruginous-pubescent. Flowers extra-axillary, solitary, their pedicels about 2 cm long, densely ferruginous-pubescent, with an oblong-lanceolate, acuminate, 6 to 7 mm long bracteole at the lower one-third. Sepals 3, sometimes 4, oblong-ovate, obtuse or acute, ferruginous-pubescent, coriaceous, about 9 mm long and 5.5 mm wide. Outer petals 3, sometimes 4, narrowly lanceolate, ferruginous-pubescent, 5.5 cm long, 1 cm wide below, convex at the base, above chan-

neled-concave, narrowed upward; inner petals 3, glabrous or very slightly pubescent toward their apices, coriaceous, oblong-ovate, slightly acuminate, about 9 mm long and 4 to 4.5 mm wide, keeled. Anthers many, 2.2 to 2.5 mm long, the cells concealed by the overlapping connectives. Carpels numerous, densely ferruginous-hirsute, including the style and stigma about 2.5 mm long, the style glabrous, slender, thickened upward.

PALAWAN, Malampaya Bay, Binaloan, *Merrill 9413* (type), May, 1913, in forests back of the beach. Possibly referable here is *For. Bur. 17901 Barros*, from Cagayan Province, Luzon, November, 1912, but the specimen is old, poorly prepared, and in fruit only.

The alliance of this species is with *Oxymitra latifolia* Hook. f. & Th. of the Malay Peninsula, but with more numerous lateral nerves, larger flowers, and longer pedicels. From *Oxymitra longiflora* Merr. it differs notably in its shorter flowers.

GONIOTHALAMUS Hook. f. & Thomson

GONIOTHALAMUS COPELANDII sp. nov.

Arbor glabra vel subglabra; foliis oblongis, chartaceis, usque ad 20 cm longis, basi acutis apice brevissime abrupte acuminatis, nervis utrinque circiter 18, subtus prominentibus, anastomosantibus; floribus in ramis defoliatis, solitariis vel fasciculatis, pedicellatis, circiter 5 cm longis, petalis interioribus carpellisque pubescentibus, cetero glabris; stigmatibus anguste hypocrateriformibus, truncatis, fissis.

A tree about 15 m high, quite glabrous except the terminal buds, the interior petals, and the carpels. Branches terete, dark-colored when dry, wrinkled. Leaves oblong, chartaceous, rather pale when dry, slightly shining and of about the same color on both surfaces, the base acute, the apex abruptly and very shortly acuminate; lateral nerves about 18 on each side of the midrib, rather slender but very prominent on the lower surface, distinctly anastomosing, mostly impressed on the upper surface, the reticulations slender, lax, not prominent; petioles 1 to 1.5 cm long. Flowers greenish, tinged with lavender, on the branches below the leaves, solitary, in pairs, or in fascicles, their pedicels about 2 cm long, subtended by small bracts. Sepals thickly coriaceous, ovate, about 14 mm long, 9 mm wide, rounded, rather distinctly nerved, glabrous. Outer three petals very thickly coriaceous, almost fleshy when fresh, glabrous, oblong to oblong-ovate, the apex rounded, margins thickened and somewhat incurved, 4 to 5 cm long, 2 to 2.5 cm wide, the base somewhat contracted to a width of about 7 mm and there slightly concave; inner three petals connivent into a cone by their very thick

margins, sessile, oblong-ovate, obtuse, very thick, slightly pubescent externally, concave, 10 to 12 mm long, 6 mm wide. Stamens indefinite, linear-oblong, flat, 4 to 4.5 mm long, about 1 mm wide, closely packed, the connectives ovate-sagittate, 1 mm long, rostrate-acuminate. Carpels many, pubescent, narrowly oblong, about 2 mm long, narrowed into the slender, flattened, 2 mm long styles, the stigmas narrowly funnel-shaped, truncate, split down one side, 1 mm wide when spread, ovule solitary, basal.

MINDANAO, District of Zamboanga, Sax River, mountains back of San Ramon, *Merrill 8297*, November 28, 1911, in hill forests, altitude about 900 meters.

Apparently a very distinct species, in its stigma-characters allied to *Goniothalamus tenuifolius* King, but otherwise very different and in habit and general appearance somewhat resembling *G. prainianus* King, to which, however, it does not seem to be closely allied.

GONIOTHALAMUS GIGANTIFOLIUS sp. nov.

Frutex circiter 5 m altus, glaber vel subglaber; foliis oblongis, chartaceis ad subcoriaceis, usque ad 60 cm longis et 20 cm latis, nitidis, pallidis, basi acutis, apice latissime breviter obtuse acuminatis vel obtusis, nervis utrinque circiter 30, valde prominentibus, supra impressis, arcuate-anastomosantibus, reticulis distinctis, laxis, floribus caulinis vel e ramis vetustioribus, ut videtur solitariis, breviter pedicellatis; fructibus oblongis, cylindraceis, acuminato-rostratis, 2.5 to 4.5 cm longis, circiter 1 cm diametro, in siccitate rugosis, glabris; seminibus 2.

A shrub about 5 m high, apparently quite glabrous except parts of the flower and fruit. Branches terete, smooth, dark reddish-brown. Leaves very large, up to 60 cm long and 20 cm wide, oblong, firmly chartaceous to subcoriaceous, rather pale, of the same color, and shining on both surfaces when dry, the base acute, the apex very shortly, broadly, and obtusely acuminate or merely obtuse; lateral nerves about 30 on each side of the midrib, somewhat ascending, nearly straight, impressed on the upper surface, very prominent on the lower surface, prominently arched-anastomosing 1 cm from the margin or less to form a very prominent, arched, marginal nerve; petioles stout, about 2 cm long. Flowers unknown, from the trunk or the larger branches, solitary, the pedicels, in fruit, 1 to 1.5 cm long, subtended by several small basal bracteoles, slightly pubescent. Fruits 5 to 20 on each peduncle, oblong to cylindric, 2.5 to 4.5 cm long, about 1 cm in diameter, very dark brown when dry, the pericarp thin, wrinkled, base acute, apex prominently rostrate-acuminate, externally very sparingly pubescent with scattered, short, shining,

brown hairs, the pedicels about 1 cm long, with more numerous similar hairs. Seeds 2, rarely 3, about 1 cm long and 5 mm thick, prominently ruminate.

BASILAN, near Singal, *For. Bur. 18958 Miranda*, September 26, 1912, altitude about 160 meters.

A very strongly marked species readily distinguishable by its very large, prominently nerved leaves, its solitary cauline flowers, and its cylindric, rostrate-acuminate fruits. It apparently belongs in the group with *Goniothalamus curtisii* King.

GONIOTHALAMUS AMUYON (Blanco) comb. nov.

Uvaria amuyon Blanco Fl. Filip. (1837) 463.
Unona cauliflora Blanco Fl. Filip. ed. 2 (1845) 323; ed. 3, 2 (1878) 235.
Melodorum fulgens F.-Vill. Novis. App. (1880) 7, non Hook. f. & Th.
Goniothalamus gitingensis Elm. Leafl. Philip. Bot. 5 (1913) 1710.

The species recently described by Elmer as *Goniothalamus gitingensis* is quite identical with the form I interpret as *Uvaria amuyon* Blanco. It is not an abundant species in the Philippines, but is widely distributed. I refer here the following specimens: LUZON, Province of Ilocos Sur, *For. Bur. 5642 Klemme:* Province of Pangasinan, *Alberto:* Province of Batangas, *Ramos:* SIBUYAN, *Elmer 12507.* BOHOL, *Bur. Sci. 1229 McGregor.* Its name in Ilocos Sur and Pangasinan is *sagiat;* in Batangas and in Bohol *amuyong* or *amuyon,* and its fruits are used for medicinal purposes. An allied form occurs in Tayabas, appearing under the Tagalog name *amuyong,* but it does not agree as well with Blanco's description as does the present form.

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PLANTAE WENZELIANAE, III

By E. D. MERRILL[1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The second paper under the above title was published in 1914,[2] and the present one is in all respects similar to it, being based primarily on botanical material collected by Mr. C. A. Wenzel, in Leyte. In the first two papers seventy-one new species were proposed, while in the present one twenty-one new species are described and the new genus *Wenzelia* of the family *Rutaceae*. The genera *Trigonopleura* and *Sarcostigma* are new to the Philippine flora. New forms are described in the following families: *Rutaceae, Euphorbiaceae, Moraceae, Commelinaceae, Urticaceae, Fagaceae, Burseraceae, Araceae, Symplocaceae, Myristicaceae, Flacourtiaceae, Caprifoliaceae, Lauraceae, Melastomataceae,* and *Icacinaceae.* A few notes on nomenclature are included.

ARACEAE

RHAPHIDOPHORA Hasskarl

RHAPHIDOPHORA ACUMINATA sp. nov.

Scandens, ramis circiter 0.5 cm diametro; foliis oblongis, subcoriaceis, integris, oblongis ad oblongo-lanceolatis, inaequilateralibus, usque ad 23 cm longis, tenuiter caudato-acuminatis, basi subacutis, nitidis, nervis utrinque numerosis, dense dispositis, primariis quam secundariis paullo distinctioribus; spadicibus cilindricis, circiter 10 cm longis, 1 cm diametro.

Scandent, glabrous, about 4 m high, the stems about 1 cm in diameter, the branchlets 5 mm thick. Leaves subcoriaceous, dark olivaceous when dry, shining, oblong to oblong-lanceolate, 12 to 23 cm long, 5 to 8 cm wide, apex slenderly caudate-acuminate, base subacute, distinctly inequilateral, one side one-third to one-half wider than the other; lateral nerves very numerous, slender, dense, the primary ones more distinct than

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[2] Philip. Journ. Sci. 9 (1904) Bot. 353–389.

the secondary, about 10 on each side of the midrib, ascending; petioles 9 to 13 cm long, the younger ones with membranaceous sheathlike margins up to 5 mm in width, extending nearly or quite to the apex of the petiole and there auriculate, these deciduous in age. Peduncles about 7 cm long. Spathes not seen. Spadices sessile, dense, cylindric, about 10 cm long, 1 cm in diameter. Filaments about 3 mm long, the anthers one-third as long. Pistil 4 mm long, somewhat angled by mutual pressure, about 2 mm in diameter at the apex, slightly depressed, the stigma sessile, orbicular.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1139*, September, 1914, in forests, altitude about 500 meters, flowers white.

A species similar to and manifestly allied to *Rhaphidophora perkinsiae* Engl., from which it differs in its relatively narrower, somewhat thinner, slenderly acuminate leaves, its much slenderer spadices, and its shorter flowers.

COMMELINACEAE

CYANOTIS D. Don

CYANOTIS PEDUNCULATA sp. nov. § *Eucyanotis.*

Planta circiter 20 cm alta, caulibus inferne prostratis, radicantibus, parce ramosis; foliis oblongo-ovatis, chartaceis, glabris, acuminatis, usque ad 4.5 cm longis, in siccitate plus minusve purpureis; inflorescentiis terminalibus, longe pedunculatis, bracteis 2 magnis valde inaequalibus suffultis, bracteolis lanceolatis, numerosis, circiter 4 mm longis, carinatis, ciliatis; petalis purpureis, circiter 5 mm longis, tubo 7 mm longo.

A rather slender plant about 20 cm long, the stems prostrate below and rooting at the nodes, then erect or ascending, glabrous, simple or with a single branch. Leaves chartaceous, glabrous, oblong-ovate or oblong, 3 to 4.5 cm long, 1.5 to 2 cm wide, acuminate, base rounded, more or less purple when dry; sheaths loose, 6 to 8 mm long, bearded at the base and apex with long soft hairs, a few similar hairs along the side opposite the attachment of the leaf. Inflorescence terminal, the peduncles 5 to 6 cm long, the flowers rather numerous, scorpioid, but one or two opening at a time, all inclosed by two large, very unequal, imbricate, spreading bracts, the basal parts of the bracts inflated, about 8 mm long, the larger one outermost and bearded in the central part of the inflated portion on both sides; limbs spreading, that of the smaller bract 1 cm long or less, of the larger one oblong, acuminate, up to 2.5 cm long. Flowers numerous, purple, scorpioid, but one or two opening at a time, the bracteoles nu-

merous, imbricate, acuminate, about 4 mm long, lanceolate, ciliate on one side. Calyx 6 mm long, the lobes oblong-ovate, 1.5 mm long, the tubular part compressed, keeled on one side or even narrowly winged, the keel or wing hispid-ciliate. Corolla-tube very slender, about 7 mm long, the lobes prominently nerved, purple, about 5 mm long and 2.4 mm wide, elliptic-ovate, obtuse. Fertile stamens 5, the connectives broad; anthers about 1 mm wide and 0.3 mm long.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1024*, July 25, 1914, in forests, altitude about 500 meters.

A species apparently belonging in the group with *Cyanotis cristata* R. & S., but entirely different in its inflorescence. It is strongly characterized by its terminal, long-peduncled inflorescence, the flowers scorpioid and inclosed by two imbricate, large, very unequal bracts, the bracteoles numerous, lanceolate, imbricate, about 4 mm in length.

FAGACEAE

QUERCUS Linnaeus

QUERCUS WENZELII sp. nov. § *Cyclobalanus*.

Arbor circiter 20 m alta, inflorescentiis fructibusque minute griseo-puberulis exceptis glabris; foliis, ramis teretibus; foliis coriaceis, ovato-ellipticis ad ellipticis, usque ad 13 cm longis, pallidis, nitidis, integris, basi acutis, apice abrupte prominente acuminatis, acuminis obtusis; nervis utrinque circiter 10, prominentibus; glandibus ovoideis, apiculatis, puberulis, circiter 1.5 cm longis, 1.2 cm diametro; cupulis extus minutissime obscure griseo-puberulis, laminibus circiter 7, denticulatis.

A tree about 20 m high, quite glabrous except the obscurely gray-puberulent inflorescences, cups, and more distinctly pubescent fruits. Branches terete, brownish, smooth, obscurely lenticellate, the young branchlets quite glabrous. Leaves alternate, coriaceous, pale and shining when dry, ovate to ovate-elliptic, 7 to 11 cm long, 3.5 to 7 cm wide, base acute, apex rather abruptly and prominently acuminate, the acumen rather slender, blunt, usually about 1 cm long, the upper surface pale or pale greenish when dry, strongly shining, the lower surface paler than the upper, dull or slightly shining, the nerves pale brownish; lateral nerves about 10 on each side of the midrib, very prominent, nearly straight, somewhat ascending; petioles brownish, about 1 cm long. Male spikes axillary, solitary in the upper axils, up to 10 cm long, obscurely puberulent, the flowers mostly in scattered fascicles of threes. Fruiting spikes up to 9 cm long, gray-puberulent, the rachis rather stout, the fruits up to 12 in each spike,

rather crowded. Cups up to 1.4 cm in diameter and 8 mm high, obscurely puberulent externally, appressed-pubescent inside, truncate, each composed of about 7 concentric, distantly and obscurely denticulate laminæ, the lower laminæ distant, the upper ones approximate, the scales quite united. Gland ovoid, apiculate, externally gray-puberulent, about 1.5 cm long and 1.2 cm in diameter.

LEYTE, Buenavista, near Jaro, *Wenzel 1157* (type), in fruit, *1008*, with male flowers, October 12 and July 18, 1914. In forests, altitude about 500 m.

A species belonging in the group with *Quercus mindananesis* Elm., from which it is at once distinguished by being nearly glabrous. In vegetative characters it somewhat resembles *Quercus lipacon* Elm., but its fruits are entirely different.

MORACEAE

FICUS Linnaeus

FICUS JAROENSIS sp. nov. § *Eusyce.*

Frutex scandens foliis utrinque ramulisque parce longe ciliatis; foliis alternis, oblongis, coriaceis, usque ad 15 cm longis, apice acuminatis, basi late rotundatis ad leviter cordatis, supra pallide viridis, subtus plus minusve brunneis, integris, margine recurvatis, nervis utrinque circiter 6, supra impressis, subtus valde prominentibus; receptaculis axillaribus, solitariis vel binis, subglobosis, glabris, breviter pedunculatis, circiter 1 cm diametro.

A scandent shrub reaching a height of 20 meters, the young branches and the leaves on both surfaces sparingly ciliate with long, scattered, more or less spreading, rather pale hairs. Branches terete, reddish-brown, sparingly papillate, the hairs from the papillæ. Leaves alternate, oblong, coriaceous, 8 to 15 cm long, 3.5 to 5.5 cm wide, prominently acuminate, base broadly rounded to obscurely cordate, margins entire, recurved, the upper surface pale greenish when dry, shining, with scattered papillæ, the hairs from the papillæ, the lower surface brownish, the hairs more numerous than on the upper surface; lateral nerves about 6 on each side of the midrib, these and the primary reticulations impressed on the upper surface, very prominent on the lower surface, the nerves curved-ascending, anastomosing; petioles about 1.5 cm long, reddish-brown, sparingly ciliate with long, spreading hairs. Receptacles axillary, solitary or in pairs, glabrous, globose, about 1 cm in diameter, brown when dry, smooth, their peduncles 4 to 6 mm long, with three broadly ovate bracteoles about 1 mm in length at the base of the peduncle. Fertile female flowers subsessile to stipitate, the perianth seg-

ments spatulate, equal, about 3 mm long, the ovary oblong, about 2 mm long, rounded at the apex, with a very short lateral style.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1089*, September 9, 1914, the fruit yellow, becoming red when fully matured. In forests, altitude about 500 meters.

A species similar to and manifestly closely allied to *Ficus crininervia* Miq., from which it differs in its thicker leaves which are rounded or only very slightly cordate at the base, not with a deep prominent sinus as in Miquel's species.

URTICACEAE

LEUCOSYKE Moritzi

LEUCOSYKE LEYTENSIS sp. nov.

Frutex circiter 5 m altus; stipulis circiter 3 cm longis, extus prominente albido-villosis, chartaceis; foliis oblongis, chartaceis vel subcoriaceis, usque ad 20 cm longis, acuminatis, basi leviter inaequilateralibus, subrotundatis, distincte triplinerviis, subtus subalbidis, ad costa reticulisque ciliatis; capitulis ♀ axillaribus, plerumque binis, 7 ad 10 mm diametro, pedunculatis.

A shrub about 5 m high, the branchlets and petioles prominently ciliate with spreading white hairs, the branches and branchlets somewhat reddish-brown in color. Leaves oblong, chartaceous to subcoriaceous, harsh, 17 to 20 cm long, 5 to 7 cm wide, the upper surface olivaceous, shining, scabrid, the lower surface nearly white, prominently white-ciliate on the nerves, with fewer hairs on the reticulations, the nerves and reticulations brown in contrast to the pale surface, the apex sharply acuminate, base somewhat inequilateral, subrounded, distinctly 3-plinerved, the lateral nerves leaving the midrib near the base and extending about four-fifths to the apex, prominent, the margins serrate-crenate; petioles about 1.5 cm long; stipules about 3 cm long, chartaceous, somewhat boat-shaped, hardly keeled, externally prominently white-ciliate, the hairs rather soft, spreading below, more or less appressed in the upper part. Pistillate heads mostly in pairs, sometimes solitary, axillary and in the axils of fallen leaves, globose, 7 to 10 mm in diameter, their peduncles ciliate, 8 to 10 mm long. Achenes oblong-ovoid, about 1.5 cm long, obscurely penicillate at the apex.

LEYTE, Buenavista, Jaro, *C. A. Wenzel 1061*, August 20, 1914, in forests, altitude about 500 meters.

The species in general resembles *Leucosyke aspera* C. B. Rob., from which it differs in its short petioles, while it is distinguished from both *Leucosyke mindorensis* C. B. Rob. and *L. negrosensis* C. B. Rob. in its indumentum, and from the latter also in its short petioles.

OLACACEAE

WORCESTERIANTHUS Merrill

WORCESTERIANTHUS MAGALLANENSIS (Elm.) comb. nov.

Flacourtia magallanense Elm. Leafl. Philip. Bot. 4 (1912) 1519.
Worcesterianthus casearioides Merr. in Philip. Journ. Sci. 9 (1914) Bot. 288.

Flacourtia magallanensis was based on four numbers of Elmer's collection from Sibuyan, *12476*, *12323*, *12079*, and *12142*, all in fruit. This material, which I have recently been able to examine, is of the same species as are the specimens on which *Worcesterianthus casearioides* was based. Additional specimens are: LUZON, Province of Tayabas, *For. Bur. 21629 Lopez, Bur. Sci. 19528 Ramos:* Province of Laguna, *Bur. Sci. 20607 Ramos.*

MYRISTICACEAE

MYRISTICA Linnaeus

MYRISTICA WENZELII sp. nov. § *Fatua.*

Arbor circiter 15 m alta, subtus foliis junioribus ramulisque minute ferrugineo-puberulis; foliis oblongis, coriaceis, acuminatis, basi obtusis ad rotundatis, usque ad 38 cm longis, nervis utrinque circiter 35, prominentibus; floribus ♂ fasciculatis, in tuberculis crassis ferrugineis brevis simplicibus vel obscure furcatis dispositis; sepalis circiter 5 mm longis.

A tree about 15 m high, the branches terete, brown, wrinkled, rather stout, glabrous, the growing parts minutely ferruginous-puberulent. Leaves oblong, coriaceous, 20 to 38 cm long, 7 to 9 cm wide, entire, apex distinctly acuminate, base rounded to obtuse, margins somewhat recurved, the upper surface rather pale, shining, entirely glabrous, the midrib very prominent, the lower surface in younger leaves of about the same color as the upper, shining, minutely puberulent, the older leaves glabrous and somewhat grayish in color; lateral nerves about 35 on each side of the midrib, prominent on the lower surface; petioles stout, 1.5 to 3 cm long, broadly channeled on the upper surface, the younger ones puberulent, the older quite glabrous. Male inflorescences chiefly on the branches below the leaves, of short, simple or obscurely forked, stout, densely ferruginous-pubescent tubercles about 5 mm long and thick, the flowers fascicled at the apices of the tubercles. Pedicels stout, pubescent, 1 to 2 mm long. Bracteole reniform, closely appressed to the calyx, pubescent, about 2 mm long and 3 mm wide. Sepals very thickly coriaceous, externally somewhat pubescent, ovate, obtuse, about 5 mm long, 3.5 mm wide. Staminal column cylindric, 3.5 mm long, 2 mm in diameter, the anthers apparently about 15, entirely united.

LEYTE, Masaganap, near Jaro, *C. A. Wenzel 1152*, September, 1914, in forests, altitude about 700 meters.

A species greatly resembling *Myristica fatua* Houtt. and manifestly closely allied to it. It differs especially in its much more numerously nerved leaves which are ultimately glabrous. It is well characterized among the Philippine species by its very short, fascicled male inflorescence, the flowers arranged at the apices of short, stout, simple or forked tubercles, the tubercles generally about 5 mm long and thick.

LAURACEAE

BEILSCHMIEDIA Nees

BEILSCHMIEDIA NERVOSA (Elm.) comb. nov.

Linociera nervosa Elm. Leafl. Philip. Bot. 5 (1913) 1652.
Beilschmiedia leytensis Merr. in Philip. Journ. Sci. 9 (1914) Bot. 357.

The type of *Linociera nervosa* Elm. was a fruiting specimen, the duplicates having been distributed under *Pygeum*. It is in all respects a *Beilschmiedia* and excellently matches my type of *Beilschmiedia leytensis*. Mr. Elmer's specific name, being the earlier, is here retained. I refer here also the following specimens: MINDANAO, Butuan Subprovince, *For. Bur. 17955, 20581 Miranda*. PALAWAN, Lake Manguao, *Merrill 9452*. It seems to be closely allied to *B. sphaerocarpa* H. Lecomte, of Indo-China.

CRYPTOCARYA R. Brown

CRYPTOCARYA PARVIFOLIA sp. nov.

Arbor, ramulis junioribus subtus foliisque junioribus plus minusve ferrugineo-puberulis, ramulis infructescentibusque glabris; foliis oblongo-lanceolatis ad lanceolatis, usque ad 7 cm longis, coriaceis, pallidis, nitidis, subtus glabris glaucescentibus, apice acuminatis, basi acutis, nervis utrinque 5 vel 6, subtus prominentibus; fructibus subellipsoideis, glabris, nitidis, in siccitate nigris, nitidis, laevis, circiter 12 mm longis.

A tree, the very young branchlets distinctly ferruginous-puberulent, the older ones slightly so, becoming glabrous, the very young leaves slightly puberulent on the lower surface, otherwise glabrous (flowers unknown). Branches slender, terete, dark brown, the branchlets slender. Leaves somewhat coriaceous, oblong-lanceolate to lanceolate, 5 to 7 cm long, 1.5 to 2.5 cm wide, apex rather slenderly and gradually acuminate, base acute, the upper surface pale or pale olivaceous when dry, very smooth and shining, the lower much paler, glaucous-white; lateral nerves 5 or 6 on each side of the midrib, prominent on the lower surface, somewhat ascending and slightly curved, the reticulations distinct; petioles 5 to 8 mm long. Panicles apparently short, the infructescences 5 cm long or less, terminal, and in the upper axils with very few short branches. Fruits subellipsoid, obtuse, subequally and slightly narrowed at both ends, smooth and shining when dry, black, glabrous, not at all wrinkled or furrowed.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 998*, July, 1914, in forests.

A species similar to and apparently closely allied to *Cryptocarya glauca* Merr. but with very much smaller leaves.

LITSEA Lamarck

LITSEA LEYTENSIS sp. nov.

Arbor circiter 20 m alta, glaberrima; foliis alternis, in ramulis ultimis plus minusve confertis, oblongis ad oblongo-oblanceolatis, coriaceis, usque ad 20 cm longis, apice obtusis ad late obscure obtuseque acuminatis, basi acutis, nervis utrinque circiter 11; floribus umbellulatis, umbellulis racemose dispositis, racemis numerosis, usque ad 10 cm longis, e ramis defoliatis; floribus 6 ad 8 mm longis, glabris, staminibus fertilibus 12, exterioribus 5 ad 6 mm longis.

A tree about 20 m high, entirely glabrous. Branches stout, terete, somewhat wrinkled when dry, grayish. Leaves crowded toward the apices of the branchlets, alternate, oblong to oblong-oblanceolate, coriaceous, 16 to 20 cm long, 5.5 to 7 cm wide, apex obtuse to shortly, obtusely, and broadly acuminate, base acute, the upper surface olivaceous or greenish-olivaceous, smooth and shining, the lower surface usually more brownish; lateral nerves about 11 on each side of the midrib, prominent on both surfaces, curved, the ultimate reticulations dense, not prominent; petioles nearly black when dry, 2 to 3 cm long. Racemes numerous, spreading, on the branches below the leaves, 5 to 10 cm long. Umbels up to 12 in each raceme, in bud globose, the peduncles stout, 3 to 4 mm long. Involucral bracts 4, broadly ovate, concave, obtuse, 6 to 8 mm long. Flowers entirely glabrous, white, usually 5 in each umbel, 6 to 8 mm long; perianth segments 6, oblong to oblong-lanceolate, obtuse to somewhat acuminate, 4 to 5 mm long. Fertile stamens 12, all 4-celled, introrse, the outer ones 5 to 6 mm long, the basal glands of the inner filaments prominent, white, capitate, 1 to 1.2 mm in diameter.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 911*, June 20, 1914, in forests, altitude about 500 meters.

The alliance of this species seems to be with *Litsea plateaefolia* Elm., from which it is distinguished by its very differently shaped leaves, much fewer nerves, and entirely glabrous flowers.

RUTACEAE

WENZELIA genus novum

(*Aurantioideae-Aurantieae-Limoniinae*)

Calyx 5-lobus. Petala 5, libera, imbricata. Stamina 10, libera, aequalia, filamentis linearibus, antherae oblongae. Discus

subcupularis. Ovarium stipitatum, 4- vel 5-loculare; stylus elongatus, cum ovario continuus, stigmate subcapitato; ovula in loculis 6, 2-seriata. Bacca corticata, paucisperma, obovoidea, basi contracta. Semina subelliptica, compressa; cotyledones carnosae. Frutex erectus, glaber, inerme. Folia alterna, brevissime petiolata, simplicia, oblonga, integerrima, glandulosa. Flores inter majores, axillares, solitarii.

WENZELIA BREVIPES sp. nov.

Frutex erectus, circiter 1 m altus, glaber; foliis alternis, oblongis, chartaceis vel subcoriaceis, usque ad 25 cm longis, acuminatis, basi obtusis ad rotundatis, in siccitate pallidis, nervis utrinque circiter 10, prominente arcuato-anastomosantibus; floribus circiter 3.5 cm longis, solitariis, axillaribus; fructibus obovoideis, basi angustatis, 3 ad 4 cm longis.

An erect, glabrous, unarmed shrub about 1 m high, the trunk about 3 cm in diameter. Branchlets slender, terete, greenish-olivaceous when dry. Leaves alternate, simple, presenting no indication of a joint between the lamina and the petiole, firmly chartaceous to subcoriaceous, oblong, pale when dry, shining, 14 to 25 cm long, 5.5 to 6.5 cm wide, distinctly glandular-punctate, entire, apex acuminate, base obtuse to rounded; lateral nerves about 10 on each side of the midrib, prominent on the lower surface, arched-anastomosing, the primary reticulations lax, prominent; petioles 2 to 4 mm long. Flowers white, fragrant, axillary, solitary, their pedicels about 1 cm long, with 2, basal, oblong-ovate, 2 mm long bracteoles. Calyx 5 to 6 mm long, cup-shaped or somewhat campanulate, 5-lobed, glandular-punctate, the lobes very broadly ovate, rounded, about 2 mm long, wider than long. Petals 5, imbricate, up to 3.4 cm long and at least 8 mm wide, oblong-oblanceolate, obtuse, narrowed below, prominently glandular-punctate. Stamens 10, free; filaments linear, 1.4 cm long, equal, rather slender, cylindric; anthers oblong, basifixed, 2-celled, about 3.8 mm long. Disk somewhat cup-shaped, 1.5 mm in diameter, forming a short gynophore. Ovary oblong-ellipsoid, glandular, about 4 mm long and 2.5 mm in diameter, 4- or 5-celled, narrowed below into the 2 to 3 mm long stalk, and above into the cylindric style, which is about 9 mm long, continuous with the ovary, ultimately deciduous; stigma subcapitate, very obscurely lobed; ovules 6 in each cell, 2-seriate, axile. Fruits obovoid, 3 to 4 cm long, base narrowed, the pericarp coriaceous-fleshy, glandular; seeds few, apparently 3 or 4 in each fruit, the cotyledons thick, fleshy, oblong-obovoid, about 1.5 cm long and 1 cm wide.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1116*, September 15, 1914, in forests, altitude about 500 meters.

This genus is certainly in the *Aurantioideae-Aurantieae-Limoniinae* of Engler in spite of the fact that the ovules are more than two in each cell. Its alliance is with *Paramigyna*, from which it is distinguished by its more numerous ovules, 6 in each cell and 2-seriate, and, so far as most of the species of *Paramigyna* are concerned, by its erect habit, and by being unarmed. The genus is dedicated to Mr. C. A. Wenzel, in consideration of the rich botanical collections he has made in Leyte during the past two years; the specific name refers to the short petioles.

BURSERACEAE

CANARIUM Linnaeus

CANARIUM CRASSIFOLIUM sp. nov. § *Tenuipyrena ?*

Arbor circiter 20 m alta, glabra (floribus ignotis), ramulis brunneis, circiter 1 cm diametro, lenticellatis; foliis usque ad 40 cm longis, foliolis 9 vel 11, crasse coriaceis, oblongis, integris, usque ad 15 cm longis, obtuse acuminatis, basi acutis ad obtusis, in siccitate pallidis, nitidis, nervis utrinque circiter 12; infructescentibus folia paullo brevioribus, paniculatis; fructibus oblongo-ovoideis, 3 ad 3.5 cm longis, utrinque obtusis, teretibus, in siccitate rugosis, endocarpium tenue.

A tree about 20 m high, entirely glabrous (flowers unknown). Branches terete, brown, the ultimate ones about 1 cm in diameter, with numerous small lenticels and with few large petiolar scars. Leaves up to 40 cm in length, the petioles, rachis, and petiolules reddish-brown when dry; leaflets 9 to 11, oblong, thickly coriaceous, pale and shining when dry, 11 to 15 cm long, 3.5 to 5 cm wide, the apex shortly and obtusely acuminate, base acute to obtuse, slightly inequilateral, the margins entire; lateral nerves 12 on each side of the midrib, prominent, curved-anastomosing near the margins; petiolules 1 to 1.5 cm long. Infructescence paniculate, in the upper axils, nearly as long as the uppermost leaves, all parts reddish-brown when dry and prominently wrinkled, the primary branches few, mostly in the upper one-half, the lower ones about 6 cm long. Fruits oblong-ovoid, terete, 3 to 3.5 cm long, about 1.5 cm in diameter, subequally narrowed to the obtuse base and apex, brownish or grayish when dry, the pericarp prominently wrinkled when dry, sometimes a little glaucous; endocarp crustaceous, thin, smooth, not at all angled or ridged, 1-celled, the cotyledons conduplicate.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1090*, September 9, 1914, in forests, altitude about 500 meters.

A species somewhat resembling *Canarium nitens* Merr., but the infructescence glabrous, the fruits smaller, and the leaflets different in shape and with fewer nerves.

EUPHORBIACEAE

BACCAUREA Loureiro

BACCAUREA PHILIPPINENSIS (Merr.) comb. nov.

Everettiodendron philippinense Merr. in Philip. Journ. Sci. 4 (1909) Bot. 279; Elm. Leafl. Philip. Bot. 3 (1910) 916.

This form was described as the basis of a new genus, *Everettiodendron*, with the statement that the affinities of the proposed new genus were not then clear to me. A recent study of more abundant material has convinced me that *Everettiodendron* is congeneric with *Baccaurea*, and accordingly the former genus is here reduced to *Baccaurea*, and its one species transferred to Loureiro's genus. In addition to the specimens cited in the original description, I have examined the following collections: LUZON, Province of Pangasinan, *For. Bur. 18493 Medina, For. Bur. 14372, 14388 Villamil, For. Bur. 21813 Maneja:* Province of Cagayan, Bur. Sci. *13821 Ramos:* Province of Zambales, *For. Bur. 20885 Lopez:* Province of Laguna, *Bur. Sci. 20416 Ramos:* Province of Tayabas, *Bur. Sci. 19516 Ramos.* LEYTE, *Wenzel 594, Bur. Sci. 15214, 15330 Ramos.*

Native names cited on the specimens are *panglumbuyen, loslospit, ebeo, malacacao* (Pangasinan), *maraculilem* (Cagayan), and *baloboy* (Zambales).

TRIGONOPLEURA Hooker f.

TRIGONOPLEURA PHILIPPINENSIS sp. nov.

Species T. malayanae similis et valde affinis, differt nervis lateralibus adscendentibus (ca. 45°), glandulis oblongo-obovoideis, antheris haud mucronatis.

A tree 6 to 8 m high, glabrous except the inflorescence and the very young puberulent branchlets and leaves. Branches terete, brownish, smooth, glabrous. Leaves oblong, thickly chartaceous or subcoriaceous, brown or brownish-olivaceous when dry, shining, the lower surface paler than the upper, 12 to 16 cm long, 4 to 6.5 cm wide, base acute, apex rather prominently acuminate, the acumen blunt; lateral nerves 6 or 7 on each side of the midrib, ascending at an angle of 45° or less, prominent, slightly curved, anastomosing, the primary reticulations lax; petioles 7 to 10 mm long. Flowers in axillary fascicles, the pedicels 1 to 2 mm long. Sepals oblong, obtuse, densely puberulent with pale brownish hairs, about 5 mm long. Petals narrowly oblong, obtuse, about 5 mm long and 2 mm wide, villous on both surfaces. Disk-glands 5, sessile, oblong-obovoid, 1.5 mm long, obtuse, glabrous. Filaments united into a column 4 to 5 mm in length, villous, bearing near the apex 8 sessile, oblong, obtuse, 1 mm long anthers in two or three series. Rudimentary ovary reduced to 2 or 3, lanceolate, 1 mm long styles or stylelike bodies, glabrous. Female flowers not seen. Fruits ellipsoid, wrinkled when dry, not angled, densely puberulent with yellowish-brown hairs, the pericarp 1 to 1.5 mm thick.

SAMAR, Cauayan Valley, *Bur. Sci. 17475 Ramos* (type), March 14, 1914. LEYTE, Buenavista, near Jaro, *Wenzel 709, 854*, April 4, 1914 (flowers), and June 5, 1914 (immature fruits), in forests, altitude about 500 meters.

Trigonopleura has hitherto been a monotypic genus, represented by *T. malayana* Hook. f. from the Malay Peninsula, so that the discovery of a second species in the Philippines is of considerable interest. The Philippine specimens were first referred to *Trigonopleura malayana* Hook. f., but as they did not agree entirely with the figure and descriptions of Hooker's species, specimens were sent to Kew for comparison with the type. In a memorandum supplied by Sir D. Prain, director of the Royal Gardens, Kew, September 26, 1914, it is noted that the Philippine plant differs from Hooker's type in the lateral nerves of the leaves diverging from the midrib at an angle of 45° or less, the glands of the staminal column oblong-obovoid and longer than wide, and the anthers obtuse, with no indication of a mucro. In *T. malayana* Hook. f. the lateral nerves always diverge at a wide angle (about 70°), the glands are nearly as broad as long, and the anthers are clearly mucronate. The specimens collected by Ramos were probably distributed as *Casearia* sp.

ICACINACEAE

SARCOSTIGMA Wight & Arnott

SARCOSTIGMA PHILIPPINENSIS sp. nov.

Frutex alte scandens inflorescentiis parcissime pubescentibus exceptis glaber; foliis oblongis, subcoriaceis, usque ad 13 cm longis, in siccitate pallidis, nitidis, apice breviter obscure obtuse acuminatis apiculatisque, basi acutis, nervis utrinque circiter 5, subtus valde prominentibus, curvato-adscendentibus, utrinque subfoveolato-reticulatis; paniculis axillaribus, laxis, usque ad 40 cm longis, ramis paucis, inferioribus usque ad 16 cm longis; floribus fasciculatis, sessilibus, 2.5 ad 3 mm longis, fasciculis distantibus.

A woody vine reaching a height of 30 m and a diameter of 10 cm, entirely glabrous except the younger parts of the inflorescence. Branches terete, grayish, sparingly lenticellate, slender. Leaves alternate, oblong, subcoriaceous, entire, 8 to 13 cm long, 2.5 to 4.5 cm wide, pale and shining when dry, of the same color on both surfaces, the apex obscurely broadly acuminate and usually somewhat apiculate, base acute; lateral nerves about 5 on each side of the midrib, prominent on the lower surface, curved-ascending, obscurely anastomosing, the reticulations rather dense, subfoveolate and about equally distinct on both surfaces; petioles 2 to 3 cm long. Panicles axillary, lax, up to 40 cm long, the branches scattered, slender, the lower ones up to 16 cm in length, the younger parts obscurely appressed-pubescent. Male flowers sessile, mostly in scattered fascicles, or on very young parts of the scattered branches, which are spicately

arranged on the primary branches, 5-merous, yellow. Calyx shallow, about 1.3 mm in diameter, 0.5 mm high, obscurely denticulate. Petals 5, free, narrowly oblong, about 3 mm long, 1 mm wide, glabrous. Stamens alternating with the petals; filaments 1 mm long; anthers ovoid, as long as the filaments. Rudimentary ovary oblong-ovoid, hirsute, 0.7 mm long.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 987*, July 16, 1914, in forests, altitude about 500 meters.

The first representative of the genus to be found in the Philippines and allied to *Sarcostigma wallichii* Baill., differing, however, in many characters, the leaves entirely glabrous not pubescent beneath, petioles much longer, and nerves fewer; the male inflorescence is entirely different, consisting of lax panicles up to 40 cm in length, not of simple spikes.

BEGONIACEAE

BEGONIA Linnaeus

BEGONIA WENZELII nom. nov.

Begonia leytensis Merr. in Philip. Journ. Sci. 9 (1914) Bot. 379, non Elm.

Begonia leytensis Elm. is a synonym of *Begonia quercifolia* A. DC. [see Merrill in Philip. Journ. Sci. 7 (1911) Bot. 311], and the previous use of this name was inadvertently overlooked by me when characterizing *B. leytensis* Merr. I accordingly propose the above new name for the form described by me as *Begonia leytensis*.

FLACOURTIACEAE

CASEARIA Jacquin

CASEARIA PHANEROPHLEBIA sp. nov.

Frutex circiter 5 m altus, subtus foliis minute puberulis exceptis glaber; foliis oblongis ad oblongo-obovatis, usque ad 22 cm longis, integris vel obscure denticulatis, acuminatis, basi acutis, nervis utrinque circiter 12, subtus valde prominentibus; floribus numerosis, fasciculatis, fasciculis axillaribus et in axillis defoliatis, sepalis glabris, 5 mm longis, ovario pubescens.

A shrub about 5 m high, nearly glabrous. Branches terete, rather stout, grayish-brown when dry, the young branchlets reddish-brown. Leaves shortly petioled, oblong to oblong-obovate, coriaceous, 14 to 22 cm long, 5 to 10 cm wide, apex acuminate, base acute, margins entire or very obscurely denticulate, pale brownish when dry, shining and of the same color on both surfaces, the upper surface glabrous, the lower minutely puberulent with scattered hairs; lateral nerves about 12 on each side of the midrib, very prominent on the lower surface, impressed on the upper surface, the reticulations subparallel, prominent; petioles about 5 mm long. Fascicles axillary and in the axils

of fallen leaves, many-flowered. Flowers yellow, their pedicels 1.5 to 2.5 mm long, glabrous. Sepals glabrous, elliptic to oblong-obovate, obtuse, 5 mm long, 3 mm wide. Staminal-tube about 2 mm long, the stamens 8, free portions of the filaments equaling the anthers; anthers ovoid, apiculate, about 1 mm long; the alternating staminodes oblong, obtuse, pubescent at the apex, about 1 mm long. Ovary and style pubescent, about 3 mm long, the ovoid ovary narrowed upward into the short stout style.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 979*, July 30, 1914, in forests, altitude about 500 meters.

A species strongly characterized by its very prominently nerved leaves.

MELASTOMATACEAE

BECCARIANTHUS Cogniaux

BECCARIANTHUS ICKISII Merr. var. **SETOSUS** var. nov.

A typo differt foliis nerviis, ramulis paniculisque dense setosis.

LEYTE, Buenavista, near Jaro, *Wenzel 1015*, July 13, 1914. In forests, altitude about 500 meters. A tree 10 m high, the trunk 20 cm. in diameter.

The striking character of this variety is its densely setose branchlets and inflorescence. The leaves are distinctly more furfuraceous than those of the species, and with more numerous nerves.

MEDINILLA Gaudichaud

MEDINILLA LONGIPES sp. nov. § *Eumedinilla*.

Frutex scandens circiter 3 m altus, ramulis petiolisque dense longe hirsuto-setosis; foliis oppositis, petiolatis, lanceolatis, caudato-acuminatis, basi acutis, usque ad 14 cm longis, subtus ad costa nervisque parce hirsuto-setosis, pinnatinerviis, nervis utrinque 3; inflorescentiis lateralibus, simplicibus, globoso-umbellatis, longissime pedicellatis, umbellis circiter 5 cm diametro, multifloris; floribus pedicellatis, ebracteolatis, 5-meris, calycibus urceolatis, circiter 4 mm longis, staminibus 10, subaequalibus.

A scandent shrub about 3 m high, the branches slender, terete, rooting at the nodes, the internodes elongated, the younger ones and the petioles very densely hirsute-setose with spreading, pale brownish hairs up to 6 mm in length, similar but fewer hairs on the midrib and lateral nerves of the leaves on the lower surface and on the peduncles. Leaves opposite, lanceolate, chartaceous, pale greenish when dry, the upper surface quite glabrous, 12 to 14 cm long, about 3 cm wide, apex slenderly caudate-acuminate, base acute; lateral nerves pinnately arranged, 3 on each side of the midrib, curved-ascending, rather distinct, the primary reticulations distinct, lax, subparallel; petioles 1.5 to 2 cm long. Inflorescence lateral, simple, the

peduncles up to 20 cm in length, the flowers numerous, arranged in a globose-umbellate head about 5 cm in diameter. Flowers pink, 5-merous, ebracteolate, their pedicels slender, glabrous, about 12 mm long. Calyx urceolate, about 4 mm long, the limb produced about 1.5 mm, obscurely 5-toothed. Petals 5, oblong-obovate, about 8 mm long, 4.5 mm wide, narrowed below, the apex inequilaterally rounded-subtruncate. Stamens 10, subequal; filaments 4 mm long; anthers about as long as the filaments, lanceolate, acuminate, the dorsal appendage very small, 0.2 mm long, the two anterior ones oblong-ovoid, 0.7 mm long. Fruit red, about 5 mm in diameter.

LEYTE, Buenavista, near Jaro, *Wenzel 1131*, September 23, 1914, in forests, altitude about 500 meters.

A very characteristic species belonging in the group with *Medinilla annulata* C. B. Rob. It is strongly differentiated by its lanceolate, caudate-acuminate leaves, its long peduncles, its globose-umbellate simple inflorescences, and its long, spreading, hirsute-setose hairs.

MEDINILLA LEYTENSIS sp. nov. § *Eumedinilla.*

Frutex 1 ad 2 m altus, suberectus vel scandens, ramulis subtus foliis inflorescentiisque plus minusve dense stellato- vel stellato-plumoso-tomentosis; foliis oppositis, in paribus plus minusve inaequalibus, oblongis, coriaceis, usque ad 14 cm longis, acuminatis, breviter petiolatis, basi obtusis ad leviter cordatis, pinnatim 7-plinerviis; inflorescentiis axillaribus terminalibusque, simplicibus, globosis ad cylindricis, dense confertis, usque ad 4 cm longis, circiter 2 cm diametro; floribus 5-meris, quisque cum bracteis et bracteolis obovatis ad orbicularis circiter 12 mm longis circumdatis.

A suberect or somewhat scandent shrub 1 to 2 m high, the younger branchlets, petioles, leaves on the lower surface, and inflorescence more or less densely stellate- or plumose-stellate-tomentose. Branches terete. Leaves opposite, coriaceous, those of each pair more or less unequal in size, ovate to oblong-ovate, 6 to 14 cm long, 2.5 to 5 cm wide, the smaller of each pair more or less similar in shape to the larger but from one-half to two-thirds as long, acuminate, base obtuse to somewhat cordate, pinnately 7-plinerved, the nerves ascending, upper surface grayish and shining when dry, glabrous or the nerves more or less tomentose, the lower surface rather densely tomentose, the indumentum on the nerves and midrib distinctly plumose; petioles densely tomentose, 2 mm long or less. Inflorescence mostly lateral, rarely terminal, mostly from the stems below the leaves, solitary or in pairs, dense, globose to cylindric, about 2 cm in diameter, up to 4 cm long. Flowers 5-merous, spicately ar-

ranged, crowded, each subtended and surrounded by two large, colored, obovate to orbicular bracts which are densely tomentose on both surfaces, and two similar and but slightly smaller bracteoles. Calyx more or less urceolate, densely tomentose, about 7 mm long, truncate. Petals 5, about 11 mm long. Stamens 10, subequal; filaments 4 mm long; anthers about as long as the filaments, lanceolate, acuminate, the dorsal appendage stout, very short, the two anterior ones curved, about 1 mm long. Fruits tomentose, urceolate, about 6 mm in diameter.

LEYTE, Masaganap, near Jaro, *Wenzel 1140* (type), *761*, September, 1914, in forests, altitude about 700 meters.

A species belonging in the group with *Medinilla philippensis* (C. & S.) Merr., but well characterized by its densely crowded 5-merous flowers which form close globose or cylindric spicate inflorescences.

MEDINILLA OLIGANTHA sp. nov. § *Eumedinilla*.

Frutex parvus, ramulis foliis utrinque inflorescentiisque prominente longe setoso-hirsutis; foliis ternatis, oblongis ad oblongo-lanceolatis, acuminatis, usque ad 9 cm longis, basi acutis vel subobtusis, 5- vel obscure 7-plinerviis; inflorescentiis terminalibus, pedunculatis, circiter 2 cm longis, 3-floris; bracteolis orbiculari-ovatis, circiter 12 mm diametro; fructibus hirsutis, ovoideis, 5-locellatis.

An undershrub about 0.5 m high, the younger leaves when dry reddish in color, all parts more or less densely hirsute with spreading, slender, pale brownish hairs up to 5 mm in length. Branches slender, terete. Leaves whorled, ternate, chartaceous, oblong to oblong-lanceolate, those in each whorl subequal in size or one somewhat larger than the other two, 5 to 9 cm long, 1.5 to 2.5 cm wide, both surfaces prominently ciliate-setose with long, scattered, spreading hairs, the apex acuminate, base acute to subobtuse, 5- or obscurely 7-plinerved, all the nerves leaving the midrib from slightly above the base, or the outer ones from the very base; petioles densely ciliate-hirsute, about 5 mm long. Inflorescence terminal, solitary, 2 cm long, densely hirsute, about 3-flowered; bracts lanceolate, acuminate, hirsute, setose, about 5 mm long; the two bracteoles subtending and inclosing each flower orbicular-ovate, about 12 mm in diameter, externally hirsute, reddish when dry, very shortly and abruptly acuminate. Fruit ovoid or globose, hirsute, 5-celled, truncate and very obscurely 5-denticulate.

LEYTE, Masaganap, near Jaro, *Wenzel 1145*, September 29, 1914, in forests, altitude about 700 meters.

A species similar to and closely allied to *Medinilla ternifolia* Triana,

from which it is distinguished by its much shorter, few-flowered inflorescence, the leaves of each whorl nearly equal, and the base usually acute, not rounded or prominently obtuse.

MEDINILLA AFFINIS sp. nov. § *Eumedinilla.*

Frutex scandens glaber, ramis ramulisque teretibus; foliis verticillatis, obovatis, coriaceis, petiolatis, usque ad 10 cm longis, basi angustatis, cuneatis, 3-nerviis, apice late subtruncato-rotundatis apiculatisque; inflorescentiis axillaribus, fasciculatis, simplicibus, umbellatis, usque ad 5 cm longis, paucifloris; floribus 6-meris, ebracteolatis, calycibus urceolatis, truncatis, circiter 6.5 mm longis, staminibus 12, subaequalibus.

A scandent glabrous shrub up to 13 m in length, the branches and branchlets terete, grayish-brown. Leaves 4-nate, coriaceous, obovate, pale olivaceous when dry, somewhat shining, 6 to 10 cm long, 3.5 to 5 cm wide, the apex broadly subtruncate-rounded and with a stout short apiculus, the base narrowed, acute, 3-nerved, reticulations obsolete or nearly so; petioles 1.5 to 2 cm long. Inflorescence axillary, fascicled, mostly from the axils of fallen leaves, simple, umbellate, few-flowered, up to 5 cm in length, the peduncles 2 to 3 cm long, each bearing at its apex from 3 to 5, pedicelled, ebracteolate flowers. Flowers pink, 6-merous, their pedicels usually about 5 mm long. Calyx urceolate, 6 to 7 mm long, truncate, the limb very obscurely 6-toothed. Petals 6, oblong to oblong-obovate, somewhat inequilateral, about 13 mm long, 6 mm wide, narrowed at the base. Stamens 12, subequal; filaments about 8 mm long; anthers lanceolate, acuminate, about as long as the filaments, the dorsal appendage slender, curved, thickened at the end, about 2 mm long, the two anterior appendages about as long as the dorsal one, much stouter, oblong, curved. Ovary 6-celled. Fruit urceolate, about 1 cm long and 8 mm in diameter.

LEYTE, Buenavista, near Jaro, *Wenzel 1003* (type), *1091*, July 18 and September 18, 1914, the former in flower, the latter in fruit, in forests, altitude about 500 meters.

A species similar to and manifestly closely allied to *Medinilla subumbellata* Merr., but the leaves 3-nerved, not 3-plinerved, and the peduncles somewhat longer. The very long, slender, somewhat club-shaped dorsal appendages of the connectives are characteristic.

MEDINILLA WENZELII sp. nov. § *Eumedinilla.*

Frutex scandens glaber, ramis ramulisque teretibus; foliis oppositis, coriaceis, ovatis, apice brevissime acuminatis, basi acutis ad rotundatis, 5- vel 7-nerviis, petiolatis; inflorescentiis axillaribus, solitariis vel fasciculatis, usque ad 5 cm longis, sim-

plicibus, floribus paucis, umbellatim dispositis; floribus magnis, 6-meris, ebracteolatis, calycibus circiter 12 cm longis, petalis obovatis, 2.8 cm longis.

A scandent glabrous shrub reaching a height of 7 m, the branches and branchlets terete, stout. Leaves opposite, ovate, coriaceous, 8 to 14 cm long, 5 to 10 cm wide, pale when dry, somewhat shining, apex very shortly and abruptly apiculate, base acute to rounded, 5- or faintly 7-nerved, the reticulations obsolete or nearly so; petioles 2 to 3 cm long. Inflorescence lateral, simple, umbellate, solitary or fascicled up to 5 cm in length, the peduncles 2.5 to 5 cm long, mostly from the axils of fallen leaves, each with about 3 umbellately arranged, ebracteate, short-pedicelled flowers. Flowers pink, large, 6-merous. Calyx about 12 mm long and 1 cm in diameter, cup-shaped to somewhat urceolate, truncate, narrowed below to the 2 mm long pedicels. Petals 6, obovate, somewhat inequilateral, rounded, narrowed below, 2.8 cm long and 1.8 cm wide. Stamens 12, somewhat unequal; filaments about 15 mm long; anthers of the shorter stamens lanceolate, acuminate, curved, about 9 mm long, the dorsal appendage slender, truncate, somewhat flattened, curved, about 2.5 mm long, the anterior two oblong, obtuse, stout, curved, about 2 mm long; anthers of the longer filaments up to 11 mm in length. Ovary 6-celled. Fruit ovoid or globose-ovoid, truncate, about 1.5 cm in diameter.

LEYTE, Buenavista, near Jaro, *Wenzel 941* (type), *1196*, July 3, and October 11, 1914, the former in flower, the latter in fruit, in forests, altitude about 500 meters.

A species falling in the group with *Medinilla laurifolia* Blume, according to Cogniaux's arrangement, but quite different from all the other forms place here. It is characterized by its unusually large, 6-merous, umbellately arranged flowers, its short lateral inflorescences, and its opposite, ovate to broadly ovate, 5- or 7-nerved leaves.

SYMPLOCACEAE

SYMPLOCOS Jacquin

SYMPLOCOS WENZELII sp. nov. § *Bobua.*

Arbor circiter 10 m alta, ramulis subtus foliis ad costa nervisque petiolisque prominente ciliato-hirsutis; foliis coriaceis, oblongis vel oblongo-ovatis, usque ad 22 cm longis, utrinque angustatis, basi acutis, apice acuminatis apiculatisque, margine integris vel obscurissime distanter denticulatis, nervis utrinque circiter 10; inflorescentiis terminalibus, paniculatis, multifloris, circiter 13 cm longis, e basi ramosis, dense pubescentibus; floribus circiter 9 mm diametro, sessilibus vel brevissime pedicellatis,

calycibus extus dense pubescentibus; staminibus circiter 100; ovario 3-loculare.

A tree about 10 m high, the branches terete, the ultimate ones about 5 mm in diameter, pale brownish, prominently ciliate-hirsute with spreading hairs as are the petioles and the midrib and nerves on the lower surfaces of the leaves. Leaves coriaceous, greenish when dry, oblong to oblong-ovate, 18 to 22 cm long, 7 to 9 cm wide, subequally narrowed to the acute base and the rather prominently acuminate apex, the acumen apiculate, the upper surface shining, sparingly ciliate-hirsute with scattered, long, pale, weak hairs, the margins entire or very obscurely and distantly denticulate; lateral nerves about 10 on each side of the midrib, very prominent, curved-anastomosing, the reticulations lax; petioles about 1.5 cm long, prominently long ciliate-hirsute. Inflorescence terminal and in the uppermost axils, paniculate, many-flowered, up to 13 cm long, rather densely brown-pubescent, branched from or near the base. Flowers white, rather crowded on the ultimate branchlets, 8 to 9 mm in diameter, sessile or shortly pedicelled, the bracts lanceolate, acuminate, up to 3.5 mm long, pubescent. Calyx about 3 mm long and wide, rather densely pubescent, the lobes subreniform, about 1 mm long, 1.5 mm wide, rounded, much shorter than the tube. Corolla-lobes suborbicular, spreading or reflexed, about 4 mm in diameter, externally very slightly and obscurely pubescent with short scattered hairs. Stamens about 100, obscurely pentadelphous; filaments glabrous, 3 to 4 mm long. Ovary densely pubescent, 3-celled; style glabrous, 4 mm long.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1022*, July 24, 1914, in forests, altitude about 500 meters.

A species allied to *Symplocos patens* Presl, but at once distinguished from that species by its much larger leaves, more numerous stamens, petals nearly glabrous externally, and especially by its indumentum, the young branches, petioles, and both surfaces of the leaves with long, spreading, weak, pale or brownish hairs.

SYMPLOCOS PACHYPHYLLA sp. nov. § *Bobua.*

Arbor circiter 6 m alta, floribus exceptis glabra; foliis crasse coriaceis, oblongo-obovatis, usque ad 20 cm longis, subacutis vel obtusis, basi decurrento-acuminatis, margine integris vel obscure denticulatis, nervis utrinque circiter 10, tenuibus; inflorescentiis axillaribus, spicatis, simplicibus, circiter 1 cm longis, floribus confertis; calycibus extus pallide pubescentibus; petalis glabris, circiter 5 mm longis; staminibus circiter 75, obscure pentadelphis, filamentis glabris, usque ad 9 mm longis; ovario 3-loculare; fructibus ovoideis, circiter 9 mm longis.

A tree about 6 m high, entirely glabrous except the flowers. Branches terete, brownish, the very young branchlets somewhat compressed or angled. Leaves thickly coriaceous, yellowish-green, oblong-ovate, 10 to 20 cm long, 6 to 8.5 cm wide, apex subacute to obtuse or even rounded, base narrowed, decurrent-acuminate, margins entire or obscurely denticulate; lateral nerves about 10 on each side of the midrib, slender, irregular, anastomosing, the reticulations lax; petioles 1 to 1.5 cm long. Spikes axillary, solitary, the rachis stout, about 1 cm long. Flowers numerous, crowded, yellow. Bracts subcoriaceous, ovate, obtuse, concave, externally appressed, pale or silvery-pubescent, 2.5 to 3 mm long. Calyx about 4 mm long, appressed pale-pubescent externally, the lobes 5, broadly ovate rounded, about 1.5 mm long. Corolla-lobes reflexed, glabrous, oblong, about 5 mm long, 3 mm wide, rounded. Stamens at least 75, obscurely pentadelphous, the filaments slender, glabrous, up to 9 mm in length. Ovary 3-celled; style glabrous, about 8 mm long. Fruits ovoid, smooth, not at all angular or compressed, about 9 mm long.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 1132*, September 23, 1914, in forests, altitude about 500 meters.

A species in the group with *Symplocos cumingiana* Brand (*S. angularis* Elm.), but with much larger, quite differently shaped leaves, larger flowers, and much more numerous stamens.

CAPRIFOLIACEAE

VIBURNUM Linnaeus

VIBURNUM PLATYPHYLLUM sp. nov. § *Euviburnum.*

Arbor alta, glaberrima; foliis chartaceis vel subcoriaceis, usque ad 22 cm longis, integris vel obscure undulatis, basi acutis ad obtusis, apice acuminatis apiculatisque, nervis utrinque circiter 7, distantibus, prominentibus, subtus in axillis glandulosis; inflorescentiis umbellato-corymbosis, amplis, multifloris, pedunculatis, circiter 16 cm longis latisque; floribus circiter 5 mm longis, corollae tubo cylindraceo, lobis erectis; fructibus anguste ovatis, compressis, circiter 9 mm longis.

A tall tree, entirely glabrous. Branches terete, dark-colored when dry, sparingly lenticellate, the younger ones dark reddish-brown. Leaves ovate to oblong-ovate, 9 to 22 cm long, 4 to 10 cm wide, firmly chartaceous to subcoriaceous, pale olivaceous and somewhat shining when dry, margins entire or minutely and obscurely undulate, apex gradually narrowed to the usually elongated and rather slender acumen, the acumen coarsely apiculate, base obtuse to acute; lateral nerves about 7 on each side

of the midrib, prominent, ascending, the axils on the lower surface, both of the primary nerves and the coarser secondary ones glandular; petioles 4 to 5 cm long, of the smaller leaves 1 to 2 cm in length. Inflorescence a terminal, peduncled, umbellate corymb about 16 cm long and wide, the peduncles stout, about 4 cm long, the primary branches about 7, spreading-ascending, 4 to 6 cm long, then verticillately branched. Flowers white, fragrant, numerous. Calyx about 2.5 mm long, obscurely 5-toothed. Corolla cylindric, about 4 mm long, the lobes erect, oblong ovate, about 1.5 mm long. Filaments about 7 mm long; anthers 2 mm in length. Fruit oblong-ovate, compressed, 8 to 9 mm long, about 6 mm wide, wrinkled when dry, the endocarp with a single broad longitudinal ridge on one side and a corresponding depression on the other side.

LEYTE, Buenavista, near Jaro, *C. A. Wenzel 923*, June 25, 1914, in forests, altitude about 500 meters.

The height of this tree is given by Mr. Wenzel as 25 meters, the diameter of the trunk as 50 cm; it is probable, however, that the height was overestimated by him. It is similar and allied to *Viburnum glaberrimum* Merr., from which it differs in its much larger, quite differently shaped leaves. In the present species the leaves gradually taper upward to the distinctly slenderly acuminate apex, while in *V. glaberrimum* the apices of the leaves are broadly rounded to obtuse or shortly and broadly blunt-acuminate. Among the extra-Philippine forms an ally of *Viburnum coriaceum* Blume, but very different from that species.

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NEW OR NOTEWORTHY PHILIPPINE PLANTS, XII

By E. D. MERRILL [1]

(From the Botanical Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

The preceding number of this series was published in the early part of the present year,[2] and the present contribution is essentially like its predecessors. Seven genera are for the first time credited to the Archipelago, *Avena, Polytoca, Angelesia, Glyptopetalum, Ochrocarpus, Asystasia,* and *Polytrema.* Sixty-two new species are described in various families, while 18 species previously described from extra-Philippine material are for the first time credited to the Archipelago. The total additions to the Philippine flora in the present paper are eighty species. Some reductions are made, and the synonymy of some species is discussed, resulting in a few cases in the substitution of older specific names for those in more general use. All proposed changes in nomenclature are in accordance with the rules of the International Botanical Congress.

GRAMINEAE

AVENA Linnaeus

AVENA FATUA L. Sp. Pl. (1753) 80; F.-Vill. Novis. App. (1880) 319; Hook. f. Fl. Brit. Ind. 7 (1897) 275.

LUZON, Benguet Subprovince, *Bur. Sci. 2812 Mearns,* April, 1907.

This European species is now widely distributed in Asia, northern Africa, and North America, a weed of cultivation. It has previously been recorded from the Philippines by F.-Villar, but his record has not before been verified. It is apparently a casual plant here and may or may not persist.

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[2] Philip. Journ. Sci. 10 (1915) Bot. 1–84.

CHLORIS Swartz

CHLORIS INCOMPLETA Roth Nov. Sp. Pl. (1821) 60; Hook. f. Fl. Brit. Ind. 7 (1897) 290.

MINDANAO, District of Zamboanga, *Merrill 8279*, December 6, 1911, along roadsides near Calarian, and on dry hills back of Zamboanga, ascending to at least 200 meters altitude. PALAWAN, Taytay, *Merrill 9275*, sandy seashore; Silanga, *Merrill 9616*, *Phil. Pl. 1308 Merrill*, open places near the seashore. LUZON, Province of Zambales, *Gates*.

Not previously reported from the Philippines, India, Formosa, and Malaya. In addition to the Philippine specimens, cited above, I have before me also *Henry 1151* from Formosa, and *Koorders 21237* from Java. *Chloris mearnsii* Merr., from Luzon, is allied, but is much smaller, with much narrower leaves, fewer, slenderer, and shorter spikes, and smaller spikelets.

POLYTOCA R. Brown

POLYTOCA HETEROCLITA (Roxb.) comb. nov.

Coix heteroclita Roxb. Fl. Ind. ed. Carey 3 (1832) 572.
Polytoca bracteata R. Br. in Benn. Pl. Jav. Rar. (1838) 20, *t. 5*; Hook. f. Fl. Brit. Ind. 7 (1897) 101.

MINDANAO, Bukidnon Subprovince, Tongkulan, *C. F. Baker 3616*, June, 1914.

The first representative of the genus to be found in the Philippines, here recorded under its oldest specific name; India to Burma, Tonkin, and Java.

CYPERACEAE

CLADIUM Schrader

CLADIUM RIPARIUM (Nees) Benth. Fl. Austral. 7 (1878) 405; C. B. Clarke Ill. Cyp. (1909) *t. 85, fig. 5–8*.

Chapelliera riparia Nees in Lehm. Pl. Preiss. 2 (1846–48) 76.
Baumea riparia Boeckl. in Linnaea 38 (1874) 246.

MINDANAO, Lake Lanao, Camp Keithley, *Mrs. Clemens 916*, January, 1907, in swamps.

In attempting to identify the above specimen, it was suspected that it might represent the species described by Gaudichaud as *Baumea glomerata*, and accordingly a duplicate was sent to the Museum of Natural History, Paris, for comparison with Gaudichaud's type. Dr. E. G. Camus, who kindly made the comparison, reports that it is not Gaudichaud's species, but is manifestly the same as *Cladium riparium* Benth., in which identification I concur after studying the description of Bentham's species and fragments supplied me by Doctor Camus for comparison. A distinct Australian type.

ARACEAE

ACORUS Linnaeus

ACORUS GRAMINEUS Soland. in Ait. Hort. Kew 1 (1789) 474; Engl. Pflanzenreich 21 (1905) 312.

LUZON, Province of Laguna, near San Antonio, on bowlders in stream beds, *Bur. Sci. 14949 Ramos*, June 20, 1912.

This species has not previously been reported from the Philippines. Widely distributed in central and in temperate eastern Asia, extending from Sikkim and Tibet to Japan, southward to Burma, southern China, and Formosa. It is known from no part of Malaya and must be considered a northern type in the Philippine flora.

The commoner and widely distributed *Acorus calamus* L. occurs in the Philippines as an introduced and cultivated plant, but is thoroughly spontaneous in some localities in Mountain Province, Luzon.

AMORPHOPHALLUS Blume

AMORPHOPHALLUS LUZONIENSIS sp. nov. § *Conophallus.*

Tuber parvum, depresso-globosum, in siccitate circiter 2 cm diametro; foliis umbraculiformibus, tripartitis, segmentis circiter 20 cm longis, pinnatisectis, segmentis utilimis oblongis vel oblongo-ovatis, caudato-acuminatis, 5 ad 9 cm longis; petiolo circiter 50 cm longo; pedunculis tenuibus, 10 cm longis; spathis circiter 15 cm longis, 6 cm latis, purpureis; spadicis quam spatha paulo brevioribus, cylindraceis, supra sensim caudato-angustatis; stilus quam ovario triplo longior.

Tubers depressed-globose, when dry about 2 cm in diameter, emitting many roots. Petioles slender, about 50 cm high; lamina umbraculiform, 3-partite, the segments pinnatisect, about 20 cm long, membranaceous, the ultimate segments oblong to oblong-ovate, caudate-acuminate, 5 to 9 cm long, nearly the same color on both surfaces or slightly paler beneath, the sinuses acute, extending almost or quite to the rachis. Sheaths of the peduncles membranaceous, brown when dry, the outer ones oblong-lanceolate, 2 to 3 cm long, the inner ones lanceolate up to 10 cm in length; peduncles slender, up to 10 cm in length. Spathes purple, about 15 cm long, thin, the tube broad, about 6 cm long, the lamina ovate, slightly acute-acuminate or merely acute, about 6 cm wide. Spadix slender, cylindric, a little shorter than the spathe, the pistillate part about 2.5 cm long, 1 cm wide, the staminate part contiguous, about 3 cm long and 8 mm wide, the appendage slender, continuous, verruculose, caudate, at the base 5 mm in diameter or less, gradually narrowed upward, the entire spadix about 14 cm long. Pistillate flowers: Ovary depressed, about 1 mm long, 1.5 mm wide, 1-celled, 1-ovuled; style slender, about 3 mm long; stigma ovoid, entire, somewhat oblique, about 1 mm long. Staminate flowers crowded, mostly 2-androus, the anthers subglobose, 1 mm long, 1.5 mm wide, opening by two terminal slits.

LUZON, Province of Cagayan, Abulug River, *For. Bur. 19560 Curran* (type), January, 1912, *Weber s. n.*, same locality and date.

A species growing in crevices of limestone ledges, quite different from any other known Philippine form. Apparently through its elongated styles

allied to both *Amorphophallus longistilus* Kurz, of the Andaman Islands, and to *A. harmandii* Engl. & Gehrm., of Cambodia, but differing from both in many characters. It is at once distinguished from the former by its much smaller spathes, and from the latter by its larger spathes and relatively much longer spadices.

AMORPHOPHALLUS DECURRENS (Blanco) Kunth Enum. 3 (1841) 581; Engl. in DC. Monog. Phan. 2 (1879) 319, Pflanzenreich 48 (1911) 108 = **AMORPHOPHALLUS CAMPANULATUS** (Roxb.) Blume!

Kunth's *Amorphophallus decurrens* was based on *Arum decurrens* Blanco Fl. Filip. (1837) 656, and is retained by Engler, in his recent monograph of the group, among the doubtful and imperfectly known species. In all characters Blanco's description applies very closely to Blume's species, which is very common and widely distributed in the settled areas throughout the Archipelago. There is no reason whatever for doubting that *Arum decurrens* Blanco, that is, *Amorphophallus decurrens* Kunth, is identical with the older *Amorphophallus campanulatus* (Roxb.) Blume.

ERIOCAULONACEAE

ERIOCAULON Linnaeus

ERIOCAULON NIGRICEPS sp. nov.

Planta dense casepitosa, inflorescentiis exceptis glabra; caulis brevibus, crassis; foliis numerosis, lanceolatis, usque ad 6 cm longis, basi brevissime vaginantibus; pedunculis numerosis, 5 ad 18 cm longis, gracilis, leviter tortis, 5-costatis; capitulis subglobosis, circiter 5 mm diametro, in siccitate nigris, bracteis albido-ciliatis; floribus ♂ sepalis 3, connatis; petalis nullis vel 1 ciliato-fissis; antheris nigris; floribus ♀ exacte trimeris, sepalis oblongis vel oblanceolatis, breviter acuminatis, apice ciliatis.

A densely cæspitose plant, glabrous except the inflorescence. Stems stout, short. Leaves numerous, densely crowded, lanceolate or narrowly lanceolate, 2 to 6 cm long, 5 to 8 mm wide, about 10-nerved, much wider at the base than above, gradually narrowed and usually obtuse. Peduncles numerous, slender, up to 18 cm in length, 5-ribbed, slightly twisted. Heads subglobose, 4 to 5 mm in diameter, nearly black or somewhat grayish when dry, dense, the involucral bracts pale, oblong to obovate, truncate, about 2 mm long. Receptacle glabrous. Floral bracts dark-colored, oblong-oblanceolate to oblong-obovate, shortly acuminate, distinctly white-ciliate toward the apex on the back. Male flowers: Calyx about 1.5 cm long, dark-colored, spathelike, at first 3-toothed, the lobes eventually becoming free nearly or quite to the base, eglandular. Petals none, or one only and ciliate-cleft into several hyaline-jointed segments. Stamens 6; anthers black. Center of the flower with 3 minute, dark-colored sessile glands. Female flowers: Sepals 3, subequal, oblanceolate to oblong, 1.8 to

2 mm long, obtuse or acute, slightly ciliate at the apex, dark-colored, not glandular. Petals 3, hyaline, linear-oblanceolate, about 1.5 mm long, slightly ciliate at the apex, not glandular. Ovary 3-celled; style-arms 3. Seeds minutely striate.

LUZON, Benguet Subprovince, Trinidad River, *Bur. Sci. 5544 Ramos* (type), December, 1908; Baguio, *Merrill 7748*, May, 1911, *Williams 1004*, October, 1904; Lepanto Subprovince, Balili, *Merrill 4646*, November, 1905.

This species is apparently distinct from all described ones, characterized especially by the corolla of the male flowers being reduced to a single ciliate-cleft petal, consisting of several jointed filiform lobes. It appears to fall in the section defined by Ruhland under section 5 of his key.

ERIOCAULON ALPESTRE Hook. f. & Th. ex Koern. in Miq. Ann. Mus. Lugd. Bat. 3 (1867) 163; Ruhl. in Engl. Pflanzenreich 13 (1903) 95.

MINDANAO, District of Davao, Mount Apo, *Copeland 1431*, October, 1904, altitude about 1,800 meters, seen in only one place.

Mountains of India to Indo-China, China, and Japan; not previously reported from the Philippines.

ERIOCAULON CINEREUM R. Br. Prodr. (1810) 254; Benth. Fl. Austral. 7 (1878) 193.

Eriocaulon sieboldianum Sieb. & Zucc. ex Steud. Syn. 2 (1855) 272; Ruhl. in Engl. Pflanzenreich 13 (1903) 111.

LUZON, Subprovince of Abra, in rice paddies, *For. Bur. 16458 Bacani:* Subprovince of Bontoc, in rice paddies, *Vanoverbergh 602:* Province of Rizal, Caloocan, *Phil. Pl. 293 Merrill* (distributed as *E. merrillii*), *Bur. Sci. 9501 Robinson* (pro parte).

This very widely distributed species does not appear to be common in the Philippines; at least it has been collected but a few times. I can see no valid reason for ignoring Robert Brown's specific name, as it is certainly valid and antedates the one accepted by Ruhland (*E. seiboldianum*) by forty-five years.

ERIOCAULON MERRILLII Ruhl. in Perk. Frag. Fl. Philip. (1904) 136.

This species was based on *Merrill 572*, collected in the Island of Culion. As described by Ruhland, one of the special characters by which the species is distinguished from allied forms is the absence of sepals in the female flowers. This character alone does not appear to be a valid one, for in the original collection, two sheets of which are in our herbarium, most of the heads have female flowers with two sepals, while other flowers are without them. The species, as interpreted by me, is the commonest and most widely distributed one in the Philippines, and appears to me to be very closely allied to, if not identical with, *Eriocaulon truncatum* Ham. I would refer to it the following specimens:

LUZON, Province of Tarlac, *Merrill 3624:* Province of Zambales, *For. Bur. 8153 Curran & Merritt:* Province of Nueva Ecija, *Bur. Sci. 5277 McGregor:* Province of Rizal, vicinity of Manila, *Merrill 7122, Bur. Sci. 9500, 9501* (pro parte) *Robinson, McGregor s. n.* POLILLO, *Bur. Sci. 9031 Robinson.* CULION, *Merrill 572* (cotype). MINDANAO, Province of Surigao, *Piper 534:* District of Lanao, Camp Keithley, *Mrs. Clemens 909* (pro parte), *s. n.*

Among the species of this genus credited to the Philippines by various authors, of which I have seen no specimens originating in the Archipelago, are the following:

Eriocaulon "longissimum" Nees; Usteri Beitr. Ken. Phil. Veg. (1905) 131, manifestly an error for *E. longifolium* Nees, as there is no such species as *E. longissimum*. I have specimens of *E. longifolium* Nees from Singapore (coll. *Ridley*), Labuan (coll. *Merrill*), Cochinchine (coll. *Pierre*), and the Caroline Islands, Yap (coll. *Volkens 406*). The species is certainly to be expected in the Philippines.

Eriocaulon sexangulare L. Reported from the Philippines, but without the citation of specimens, by Miquel Fl. Ind. Bat. 3 (1859) 523, Naves Novis. App. (1882) 299, and Ruhland in Engl. Pflanzenreich 13 (1903) 110. I have seen no Philippine specimens.

Eriocaulon truncatum Ham.; Naves Novis. App. (1882) 299; Ruhl. in Engl. Pflanzenreich 13 (1903) 107. The specimen cited by the latter author (*Cuming 2362*) was not from the Philippines, but from the Malay Peninsula. See *E. merrillii* above.

Eriocaulon setaceum L.; Naves Novis. App. (1882) 299. Probably admitted on an erroneous determination.

COMMELINACEAE

ANEILEMA R. Brown

ANEILEMA AZUREUM sp. nov. *Tricarpellaria, Euaneilema.*

Caespitosum, plus minusve pubescens praesertim inflorescentiis; foliis numerosis, anguste lanceolatis vel elongato-lanceolatis, usque ad 25 cm longis, 5 ad 10 mm latis, in siccitate dense minuteque puncticulatis, laevis, acutis vel apiculato-acuminatis; floribus azureis, cymoso-paniculatis, inflorescentiis angustis, confertis, bracteis magnis, spathulatis, pubescentibus, plus minusve imbricatis; capsulis oblongo-ellipsoideis, trigonis, circiter 6 mm longis; seminibus angulatis, in quisque loculo 4, uniseriatis.

A tufted, distinctly pubescent plant 20 to 40 cm high, the roots fibrous, no tuberous ones present on the material examined. Leaves numerous, narrowly lanceolate to elongate-lanceolate, chartaceous, 12 to 25 cm long, 5 to 10 mm wide, when dry minutely and distinctly puncticulate, smooth, not scabrous, sparingly pubescent or nearly glabrous, base not narrowed, somewhat sheathing, apex acute or apiculate-acuminate. Scapes up to 40 cm in length, simple, leafless, more or less pubescent, the flower-bearing parts rather densely pubescent. Flowers deep blue, cymose, the inflorescence narrow. Bract subtending the first branch about 4 cm long, somewhat sheathing, leaflike, the upper ones smaller, more or less imbricate, pubescent, about 1.5 cm long, 7 mm wide, acuminate, sheathing, elliptic to oblong-elliptic; bracteoles sheathing, obovate when spread out, 3 to 4

mm long. Flowers numerous. Sepals oblong to elliptic-oblong, obtuse, 3-nerved, not glandular, externally pubescent, rather thin, 4 to 5 mm long, 1.5 to 2 mm wide. Petals thinly membranaceous, about as long as the sepals, finely nerved. Stamens 6, their filaments all bearded, three sterile and three perfect, bearing oblong, 1.5 mm long anthers. Capsule 3-angled, oblong-ellipsoid, about 6 mm long, 3 mm in diameter, 3-celled, shortly pointed. Seeds 1-seriate, 4 in each cell, angular, brown, 1 to 1.3 mm. long.

SEMERARA, *Merrill 4134*, July, 1905, common in open, wet grasslands a few meters above sea level.

A species very closely allied to the Indian *Aneilema scapiflorum* Wight, differing in its relatively longer, narrower leaves which are not at all scabrous, its distinctly pubescent inflorescence, and its more or less imbricate bracts.

ANEILEMA PLATYPHYLLUM sp. nov. *Tricarpellaria, Euaneilema.*

Species a praecedente differt planta minoribus, foliis brevioribus latioribusque, usque ad 10 cm longis et 2.5 cm latis, inflorescentiis glabris, bracteis minoribus, non imbricatis, sepalis glanduloso-puncticulatis.

Like *Aneilema azureum* closely allied to the Indian *Aneilema scapiflorum* Wight, from which it differs in many characters. Tufted, the leaves comparatively few, from fibrous and tuberous roots, the tubers more or less fusiform, when dry up to 3 cm long and 6 mm in diameter. Leaves smooth, membranaceous or chartaceous, 4 to 8 in each rosette, oblong-ovate to ovate-lanceolate, 4 to 10 cm long, 1.5 to 2.5 cm wide, base not or but slightly narrowed, sheathing, apex acute or somewhat acuminate. Scapes 2 to 5 from each rosette, leafless, or with one much-reduced leaf, 12 to 20 cm high, the flowers cymosely arranged, pink or nearly white, the cymes narrow, comparatively few-flowered. Primary bracts oblong-ovate, sheathing, less than 1 cm long, acute or acuminate, the bracteoles triangular-ovate, 2 to 3 mm long. Sepals oblong-elliptic, 5 mm long, 2.2 mm wide, glandular-punctate with yellowish dots and short dashes, 3-nerved, obtuse. Petals thinly membranaceous, finely nerved, elliptic-obovate, rounded, about 5 mm long, 3.5 mm wide. Stamens 6, three sterile, three fertile, all bearded; anthers broadly elliptic, 1.5 mm long. Capsule elliptic, 3-angled, 3-celled, acute, 6 mm long, 3.5 mm in diameter. Seeds 1-seriate, 3 in each cell, superposed, brownish, angular, irregular, about 1.5 mm long.

LUZON, Province of Rizal, Antipolo, *Bur. Sci. 20985 Ramos* (type), June, 1913; Tanay, *Bur. Sci. 3342 Ramos*, June, 1907; Bosoboso, *Bur. Sci. 985 Ramos*, June, 1906.

Not as closely allied to *Aneilema scapiflorum* as is the preceding species, differing from both in its few, relatively much shorter and broader leaves, in its glandular-punctate sepals, and in its small bracts. *Loher 1340, 1939*, in the Kew Herbarium under *Aneilema scapiflorum* Wight, are both probably referable to *A. platyphyllum*.

ANEILEMA GIGANTEUM (Vahl) R. Br. Prodr. (1810) 271; Naves in Novis. App. (1880) 271; C. B. Clarke in DC. Monog. Phan. 2 (1881) 212.

Commelina gigantea Vahl Enum 2 (1806) 177.

SEMERARA, *Merrill 4132*, July, 1905. MINDANAO, Bukidnon Subprovince, *Bur. Sci. 21385 Escritor*, July, 1913.

Naves's record for this species as a Philippine one has not previously been verified. Tropical Africa and Asia through Malaya to tropical Australia.

JUNCACEAE

JUNCUS Linnaeus

JUNCUS BUFONIUS L. Sp. Pl. (1753) 328; Buchenau in Engl. Pflanzenreich 25 (1906) 105.

LUZON, Benguet Subprovince, Mount Tonglon, *Merrill 7794*, May, 1911.

Not previously reported from the Philippines; warmer parts of the entire world.

This species was found scattered along the recently constructed bridle trail to Mount Tonglon, in the mossy forest, at an altitude of about 1,900 meters. It is undoubtedly an introduced plant here.

LILIACEAE

SMILAX Linnaeus

SMILAX LOHERI sp. nov. § *Eusmilax*.

Frutex scandens glaber, ramulis teretibus, aculeis sparsis tenuibus nectis vel curvatis 2 ad 5 mm longis armatis; foliis crasse coriaceis, late ovatis, 5-nervis, basi, late cordatis, apice abrupte acuminatis apiculatisque, 8 ad 12 cm longis, subtus glaucescentibus; racemis 1-umbellatis, pedunculis 4 ad 5 cm longis; floribus numerosis, sepalis 5 mm longis.

A scandent, glabrous vine, the branches slender, terete, armed with scattered, slender, straight or somewhat curved spines 2 to 5 mm in length. Leaves very broadly ovate, thickly coriaceous, 8 to 12 cm long, 7 to 10 cm wide, when dry slightly shining, the upper surface brownish, the lower glaucous or subglaucous, the base very broad, shallowly cordate, distinctly 5-nerved, the inner pair of nerves reaching the apex of the leaf, much more prominent than the outer pair, the reticulations rather distinct, the apex abruptly acuminate, the acumen about 8 mm long, apiculate; petiole about 1 cm long, inflated, the

tendrils slender, up to 15 cm in length. Inflorescence axillary, solitary, consisting of a single umbel, the floral branch less than 1.5 cm long, subtended by a coriaceous, ovate, acuminate bract about 8 mm in length which is split down the back, the floral branch bearing at its apex a very much reduced or sometimes aborted bud, and opposite to it a single oblong, obtuse, or retuse and apiculate bract about 5 mm in length, this bract subtending the solitary, slender, 4 cm long peduncle. Male flowers 40 to 50 in each umbel, their pedicels about 8 mm long, the subtending bracteoles ovate, 2 mm long or less. Sepals about 5 mm long, 1.5 mm wide, recurved, obtuse, cucullate. Petals as long as the sepals, 0.5 mm wide. Stamens 6, all fertile, their filaments about 3.5 mm long, the anthers 1.5 mm long. Female flowers and fruits not known.

LUZON, Province of Rizal, Angilog, *Loher 6986*, April 15, 1906.

A characteristic species, distinguishable by its short-petioled, thickly coriaceous, broadly ovate leaves which are abruptly acuminate and apiculate, the base very broad, cordate, and 5-nerved, the lower surface glaucous. Among the Philippine species it is probably most closely allied to *Smilax bracteata* Presl, but that species has an entirely different inflorescence and different leaves.

SMILAX LUZONENSIS Presl Rel. Haenk. 1 (1827) 131; Miq. Fl. Ind. Bat. 3 (1859) 566.

LUZON, *Haenke* (type in herb. Prag.). MINDANAO, Lake Lanao, Camp Keithley, *Mrs. Clemens 835, 905 bis, s. n.*

This species was described by Presl from a sterile specimen, no flowers or fruits being known. I have seen the type in the Prague Herbarium, and it seems to be matched by the specimens cited above, two of which are with male flowers, the other with very immature fruits. The specimens agree with Presl's description, so far as it goes, and with a carbon rubbing of typical leaves of the type, preserved in the herbarium of the Bureau of Science.

C. DeCandolle[3] reduces *Smilax luzonensis* Presl (1827), with doubt, to *Smilax helferi* C. DC. While the two species may be identical, Presl's specific name has a priority by many years, and should be adopted, at least for the Philippine form. Only by a careful comparison between Philippine specimens of *Smilax luzonensis* Presl, and authentic specimens of *S. helferi* C. DC., will it be possible to determine whether one or two species are represented.

Smilax luzonensis Presl has solitary male umbels which are 2 to 2.5 cm in diameter, each with from 20 to 30 flowers, the peduncles slender, axillary, 2.5 to 3 cm long, bracteate at the base, and with a small ovate bracteole at the lower one-fourth or below. The pedicels are about 8 mm long; the sepals are narrowly oblong, obtuse, 6 mm long, the petals as long as the sepals but much narrower. Anthers about one-fifth as long as the filaments. Female flowers and mature fruits unknown.

[3] Monog. Phan. 1 (1878) 176.

ZINGIBERACEAE

ALPINIA Linnaeus

ALPINIA BRACHYANTHA sp. nov. § *Hellenia.*

Species *A. pubiflorae* K. Schum. ut videtur affinis, differt floribus multo minoribus vix 1 cm longis, connectivo inappendiculato.

Simple, erect, nearly glabrous, except the pubescent inflorescence, apparently less than 1 m high. Sheaths rather loose, ciliate on their margins; ligule 8 to 10 mm long, oblong-ovoid, obtuse, margins ciliate. Leaves lanceolate or narrowly oblong-lanceolate, 22 to 30 cm long, 2.5 to 3.5 cm wide, subequally narrowed at both ends, subcoriaceous, glabrous, base cuneate, apex sharply acuminate. Panicle erect, about 20 cm long, the branches two or three, spreading-ascending, about 7 cm long, many-flowered, the rachis and pedicels softly pubescent with short, spreading hairs, the pedicels 2 to 3 mm long; bracteoles apparently small, very caducous (not seen). Ovary globose to ovoid-globose, 1 to 1.5 mm in diameter, purple when fresh, very densely ciliate-pilose. Calyx-tube about 7 mm long, subequally 3-toothed, glabrous, the teeth broadly ovate, obtuse, 1.5 mm long or less, ciliate at their apices. Corolla-tube 6 to 7 mm long, about 1 mm in diameter, light green, glabrous, the lobes oblong, somewhat cucullate, 4 to 5 mm long, 2.5 to 3 mm wide. Lip 3 mm long, glandular-punctate, twice cleft, the lateral lobes rounded, obovoid, twice as wide as the oblong, obtuse inner lobes, white marked with purple. Anther 3 mm long, the connective inappendiculate.

LUZON, Province of Cagayan, Abulug River, *Weber 1571* (type), February, 1912, altitude about 60 meters; same locality, *Bur. Sci. 13920 Ramos, For. Bur. 19617 Curran.*

A species allied to *Alpinia pubiflora* K. Schum., but at once distinguished by its much smaller flowers and its inappendiculate anther-connective.

KAEMPFERIA Linnaeus

KAEMPFERIA PHILIPPINENSIS sp. nov. § *Monolophus.*

Planta erecta, saltem 50 cm alta, leviter hirsuta; foliis 9, lanceolatis, subcaudato-acuminatis, basi angustatis, acutis, vix vel breviter petiolatis, circiter 20 cm longis; spicis solitariis, paucifloris, in vaginis superioribus, corollae lobis inaequalibus, superioribus valde tubuloso-cucullatis.

A rather slender, erect plant at least 50 cm high, the stems 3 to 4 mm in diameter, the sheaths, leaves, and inflorescence with scattered, spreading, pale brown, ciliate-hirsute hairs.

Leaves 9 (or more), lanceolate, membranaceous, about 20 cm long, 3 to 3.5 cm wide, subequally narrowed to the slender, caudate-acuminate apex and to the acute base; sheaths rather loose or slightly inflated above, rather prominently ciliate-hirsute; petioles none or up to 5 mm in length. Spikes in the uppermost sheath, more or less included, short, few-flowered, only one or two flowers opening at a time, the maximum number apparently 4 or 5 in each spike, the bracts lanceolate, acuminate, about 2 mm long, 5 mm wide, hirsute. Calyx cylindric, about 12 mm long, punctate-glandular, as are the other parts of the flower, hirsute, very broadly and shortly 3-toothed. Corolla-tube slender, slightly enlarged upward, 16 mm long, sparingly hirsute, the lobes unequal, the upper one about 11 mm long, 4 mm wide in the flattened portion, slenderly 9-nerved, the apical 3 mm a cylindric, obtuse hood, the two lateral ones oblong, 7 mm long, 3 mm wide, 5-nerved, slightly cucullate at the apex; staminodes slender, lateral, attached to the margins of the lip near its base, about 2 mm long, 0.6 mm wide; lip not seen. Filament flat, glandular-punctate, 5 to 6 mm long, about 1 mm wide; anther-cells parallel, 3 mm long, the connective appendiculate, the appendage ovate, obtuse, more or less inflexed or curled when dry. Ovary villous, 3-celled, the cells with few axile ovules; style slender; stigma obconic, ciliate. Fruit not seen.

LUZON, Province of Laguna, Dahican River back of San Antonio, *Bur. Sci. 14952 Ramos*, June, 1912, in forests, flowers white.

The second species of the genus to be found in the Philippines, the only other one, *K. galanga* L., manifestly an introduced plant in the Archipelago. *Kaempferia philippinensis* Merr. manifestly belongs in the section *Monolophus*, and is very distinct from the other known species, although probably as closely allied to the Bornean *K. gracillima* K. Schum. as to any other species. The lip on the flowers available for study has been destroyed, and hence cannot be described until the plant is again collected.

FAGACEAE

QUERCUS Linnaeus

QUERCUS ROBINSONII sp. nov. § *Cyclobalanus.*

Arbor circiter 20 m alta, subtus foliis ramulisque dense ferrugineo-furfuraceis; foliis oblongo-ovatis ad oblongo-lanceolatis, coriaceis, integris, usque ad 12 cm longis, basi acutis, apice tenuiter subcaudato-acuminatis, nervis utrinque circiter 8, prominentibus; glandibus late ovoideis, glabris, circiter 1.3 cm longis latisque, apiculatis, cupulis circiter 8 mm altis, 1.6 cm diametro, ferrugineo-pubescentibus, truncatis, laminis numerosis, indistinctis, denticulis numerosis.

A tree about 20 m high, the younger parts and the leaves on the lower surface densely ferruginous-furfuraceous. Branches terete, dark-colored when dry, glabrous, sparingly lenticellate, the younger ones densely ferruginous-furfuraceous. Leaves alternate, oblong-ovate to oblong-lanceolate, coriaceous, 7 to 12 cm long, 2.5 to 5 cm wide, subequally narrowed to the acute base and to the slender subcaudate-acuminate apex, the acumen usually about 1 cm long, blunt, the upper surface furfuraceous in very young leaves, soon becoming quite glabrous, brownish-olivaceous when dry, shining, the lower surface paler than the upper, in extreme age glabrous or nearly so; lateral nerves about 8 on each side of the midrib, prominent on the lower surface; petioles 5 to 8 mm long. Male spikes up to 14 cm long, the flowers scattered below, rather crowded above. Glands broadly ovoid or conic-ovoid, glabrous, about 1.3 cm long and wide, apiculate. Cup thick, ferruginous-pubescent, broadly saucer-shaped, truncate, base thickened, about 8 mm high and 1.6 cm in diameter, the laminæ numerous, indistinct, below scattered, above approximate, the teeth numerous, distinct, less than 1 mm long.

LUZON, Province of Laguna, Mount Maquiling, *Bur. Sci. 17911 Brown* (type), May, 1913, *Bur. Sci. 17143 Robinson*, December, 1912, in forests, altitude about 700 meters. Possibly referable here are *Loher 6963*, from Rizal Province (specimens with male flowers), and *Bur. Sci. 9462 Robinson*, from Infanta, Province of Tayabas, Luzon (glands pubescent).

The alliance of this species seems to be with *Quercus caudatifolia* Merr., from which it is at once distinguished by its differently shaped gland which is as wide as long. Among the extra-Philippine species it approaches *Quercus sundaica* Blume, but has much smaller fruits than our Philippine material so referred.

URTICACEAE

LAPORTEA Gaudichaud

LAPORTEA BRUNNEA sp. nov.

Frutex, inflorescentiis exceptis glaber; foliis in siccitate utrinque brunneis, nitidis, oblongis, usque ad 22 cm longis, subcoriaceis vel chartaceis, acute acuminatis, basi acutis, leviter 3- vel obscure 5-plinerviis, longe petiolatis, nervis lateralibus utrinque circiter 15; inflorescentiis pilis paucis urentibus instructis, axillaribus, usque ad 5 cm longis, floribus ♀ flabellatim dispositis.

A shrub 1 to 2 m high, glabrous except the slightly hairy inflorescence. Branches light gray, terete, wrinkled when dry. Leaves uniformly brown, of the same color on both surfaces and slightly shining when dry, the upper surface minutely verruculose, the lower smooth, chartaceous to subcoriaceous, brittle, oblong, 12 to 22 cm long, 4 to 7.5 cm wide, subequally narrowed to

the usually acute base and to the sharply acuminate apex, entire, the base somewhat 3- or obscurely 5-plinerved; lateral nerves about 15 on each side of the midrib, rather prominent, somewhat curved; petioles 3 to 6.5 cm long. Pistillate inflorescences axillary, with few short, stinging hairs, up to 5 cm in length, the branches few. Flowers flabellately disposed on the ultimate branchlets, the ultimate branchlets usually dichotomous, short, the achenes deflexed, ovoid, compressed, about 3 mm long and 2 mm wide, the styles reflexed, very slender, about 2 mm long.

SAMAR, Cauayan Valley, *Bur. Sci. 17559 Ramos*, March, 1914, on forested slopes, the flowers blue and white.

A species well characterized by its long-petioled leaves which are uniformly brown when dry, and which are quite glabrous, with no vestiges of stinging hairs; the only part of the dried plant that presents stinging hairs is the inflorescence. The alliance of the species is manifestly with *Laportea luzonensis* Warb., on account of its flabellately arranged pistillate flowers, although in all details it is entirely different from Warburg's species.

LAPORTEA MONTICOLA sp. nov.

Frutex vel arbor parva, glabra vel subglabra; foliis oblongis ad oblongo-lanceolatis, chartaceis vel subcoriaceis, integris, tenuiter caudato-acuminatis, usque ad 10 cm longis; infructescentiis axillaribus, 6 ad 8 cm longis, fructibus circiter 4 mm diametro haud flabellatis.

A shrub or small tree, glabrous, or with very few persistent hairs when dry, the branches slender, grayish, wrinkled, the internodes short, especially on the ultimate branchlets where they are usually less than 5 mm long. Leaves oblong to oblong-lanceolate, dark olivaceous when dry, slightly shining, thickly chartaceous to subcoriaceous, entire, 7 to 10 cm long, 2 to 3.5 cm wide, base obtuse to rounded, 3-nerved, apex very slenderly caudate-acuminate, the acumen up to 2 cm in length, sharp, the upper surface rather densely white-puncticulate; lateral nerves about 6 on each side of the midrib, rather distinct, curved, anastomosing, the reticulations lax; petioles 1.5 to 2.4 cm long. Infructescences 6 to 8 cm long, axillary, the branches few, spreading, 2.5 cm long or less. Fruits white, fleshy, about 4 mm in diameter, the receptacle enlarged in fruit, the achenes inequilateral, compressed, about 2.5 mm long and 2 mm wide, but one or two on each ultimate branchlet.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19765 McGregor*, February 1, 1913, altitude not indicated, but apparently from the mossy forest.

A species somewhat resembling a small-leaved form of *Laportea luzonensis* Warb., but its fruits not flabellate. It is readily distinguished by its small leaves which are slenderly and prominently caudate-acuminate.

LAPORTEA TRIPLINERVIA sp. nov.

Arbor parva, subtus foliis pilis longis sparsis urentibus instructis; foliis oblongis, chartaceis vel membranaceis, usque ad 18 cm longis, in siccitate viridis, utrinque subaequaliter angustatis, basi acutis, triplinerviis, apice acuminatis, nervis utrinque circiter 6; infructescentiis axillaribus, usque ad 6 cm longis, fructibus in siccitate nigris, capitulis globosis, 8 ad 10 mm diametro, acheniis numerosis.

A tree up to 13 m in height, the leaves with persistent, long, stiff, scattered, stinging hairs on the lower surface. Branches pale gray, terete, 4 to 6 mm in diameter. Leaves green when dry, in general oblong, chartaceous or membranaceous, 10 to 18 cm long, 3 to 6.5 cm wide, entire, subequally narrowed to the acute, 3-plinerved base and to the acuminate apex, the upper surface rather densely white-puncticulate; lateral nerves about 6 on each side of the midrib, rather prominent, curved; petioles 2 to 4 cm long. Infructescences axillary, up to 6 cm long, with few branches, the achenes arranged in dense globose heads at the tips of the branchlets, up to 15 or more achenes in each head, the heads black when dry, 8 to 10 mm in diameter.

LUZON, Province of Tayabas, Mount Pular, *Bur. Sci. 19462 Ramos*, January 15, 1913, on forested slopes.

A species somewhat resembling *Laportea luzonensis* Warb., but with the leaves constantly acute and 3-plinerved at the base, the stinging hairs persistent on the lower surface, which sting even when dry, and with an entirely different arrangement of its fruits, the achenes crowded into dense, globose heads which are black when dry, not flabellately arranged.

PROTEACEAE

HELICIA Loureiro

HELICIA LONGIFLORA sp. nov.

Arbor parva, circiter 8 m alta, glabra; foliis late oblongo-oblanceolatis, integris, usque ad 15 cm longis, breviter obtuse acuminatis, basi acutis; racemis folia subaequantibus, paucifloris, pedicellis in paribus connatis; floribus 2.5 cm longis.

A small tree, quite glabrous, or the racemes with few, scattered, deciduous hairs, the branches rather stout, terete, brownish. Leaves subcoriaceous, broadly oblong-oblanceolate, 11 to 15 cm long, 3.5 to 5.5 cm wide, entire, the apex rather shortly and obtusely acuminate, sometimes falcate, the base gradually narrowed to the short stout petiole, cuneate and sometimes a little decurrent, upper surface olivaceous when dry, somewhat shining, the lower brownish, dull; lateral nerves prominent, about 10 on each side of the midrib, curved-ascending; petioles 5 to 8

mm long. Racemes about as long as the leaves, solitary, axillary, comparatively few-flowered. Pedicels in pairs, 4 mm long, united nearly to the middle; bracteoles deciduous (not seen). Perianth 2.5 cm long, rather slender. Anthers, including the prominent connective, 2 mm long. Hypogynous scales free or nearly so, coriaceous, ovate, 1 to 1.3 mm long.

LUZON, Province of Tayabas, Lucban (Mount Banajao), *Whitford 982*, October, 1904, margins of forests, altitude about 750 meters.

Characterized by its entire leaves and comparatively long flowers.

HELICIA INTEGRA sp. nov.

Arbor parva, glabra; foliis oblongo-lanceolatis vel oblongo-oblanceolatis, usque ad 14 cm longis, integerrimis, utrinque angustatis, apice acuminatis, basi cuneatis, brevissime petiolatis, chartaceis vel subcoriaceis; racemis folia subaequantibus, multifloris, axillaribus; floribus tenuibus, circiter 1.5 cm longis.

A small glabrous tree, or the racemes with very few, scattered, deciduous hairs. Branches terete, grayish-brown, smooth. Leaves oblong-lanceolate to oblong-oblanceolate, entire, 10 to 14 cm long, 2 to 5 cm wide, chartaceous or subcoriaceous, somewhat yellowish when dry, slightly shining, glabrous, narrowed at both ends, the apex shortly and usually sharply acuminate or acute, the base cuneate, narrowed into the very short petiole; lateral nerves 10 to 12 pairs, slender, distinct, the reticulations very slender; petioles stout, less than 3 mm long. Racemes solitary, axillary, about as long as the leaves, many-flowered. Flowers yellowish, in pairs, their pedicels in pairs, free to the rachis, about 3 mm long; bracteoles ovate, subpersistent, 1 mm long. Perianth very slender, about 0.5 mm in diameter, a little thicker at the base and apex, 1.6 cm long, the segments linear, spirally twisted in anthesis. Anthers, including the prominent connective, 1.2 mm long. Hypogynous scales free, oblong-ovate, obtuse, coriaceous, 1 mm long.

LUZON, Province of Laguna, San Antonio, *Bur. Sci. 15127 Ramos*, June, 1912, in forests along streams.

The species is characterized by its entire, nearly sessile leaves, and appears to be most closely allied to *Helicia moluccana* Blume.

POLYGONACEAE

POLYGONUM Linnaeus

POLYGONUM BENGUETENSE sp. nov. § *Persicaria, Trigyna.*

Eglandulosum, caulibus tenuibus, quadrangularibus, simplicibus vel supra leviter ramosis; ochreis cylindraceis, circiter 1 cm longis, truncatis, apice rigide ciliatis, ciliis 2 ad 3 mm longis; foliis oblongo- ad elliptico-ovatis, 1 ad 2.5 cm longis, acuminatis,

basi rotundatis vel subcordatis; racemis pedunculatis, oblongis vel cylindraceis, densis, usque ad 1 cm longis, pedunculis leviter capitato-glandulosis.

A slender, ascending, simple or very sparingly branched plant, nearly glabrous, the stems often decumbent below, 4-angled, 1 mm in diameter or less. Nodes elongated. Leaves scattered, oblong- to elliptic-ovate, chartaceous, entire, apex somewhat acuminate, base rounded or subcordate, 1 to 2.5 cm long, 7 to 12 mm wide; petioles 5 mm long or less, inserted at or near the base of the sheath, often scabrid; sheaths cylindric, split down one side, brown, membranaceous, about 1 cm long, apex truncate, the apical margin with erect, rigid, 2 to 3 mm long cilia, the base of the sheath often with few reflexed, spinelike cilia. Racemes few, short, dense, 1 cm long or less, oblong or cylindric, very loosely corymbose, the peduncles slender, sparingly capitate-glandular. Bracts oblong-ovate, margins and apex prominently ciliate, about 3 mm long. Calyx pink, 3 to 3.5 mm long, the pedicels short, the sepals oblong-obovate, obtuse. Stamens 6, with 6 alternating, small, perigynous scales. Style 3-cleft, short. Achene oblong-ovate, sharply 3-angled, about 3 mm long.

LUZON, Benguet Subprovince, Baguio, scattered among grasses and sedges on wet seepage slopes about springs, altitude about 1,550 meters, *Phil. Pl. 768 Merrill*, May, 1911, *Merrill 9682*, May, 1914, *Bur. Sci. 13483 Ramos, Bur. Sci. 14120 Robinson.*

A species apparently belonging in the section *Persicaria*, but very different from the other species placed here.

POLYGONUM CONVOLVULUS Linn. Sp. Pl. (1753) 364.

LUZON, Benguet Subprovince, Baguio, *Merrill 9698*, May, 1914, a weed in gardens, recently introduced, altitude about 1,400 meters.

Widely distributed in the north temperate zone, a native of Europe or Asia. It has not before been reported from the Philippines.

CARYOPHYLLACEAE

POLYCARPON Linnaeus

POLYCARPON INDICUM (Retz.) comb. nov.

Loeflingia indica Retz. Obs. 4 (1786) 38.
Pharnaceum depressum Linn. Mant. 2 (1771) 564, non *Polycarpon depressum* Nutt.
Polycarpaea depressa DC. Prodr. 3 (1828) 357.
Polycarpon loeflingiae Benth. & Hook. f. ex Edgew. in Hook. f. Brit. Ind. 1 (1874) 245.
Polycarpon polyphyllum Blanco Fl. Filip. (1837) 53, ed. 2 (1845) 36, ed. 3, 1 (1877) 66.

This species has been credited to the Philippines by F.-Villar, who correctly, I think, reduced to *Polycarpon loeflingiae* Blanco's *P. polyphyllum.*

The species is apparently very rare in the Philippines, but although Blanco's specimens were from Pasig, near Manila, I have seen but a single Philippine specimen that I consider referable to the genus and species: LUZON, Province of Pampanga, Arayat, *Merrill 1462*, March, 1903, erroneously placed under *Mollugo*.

RANUNCULACEAE

CLEMATIS Linnaeus

CLEMATIS LESCHENAULTIANA DC. var. **SUBGLABRIFOLIA** var. nov.

A typo differt foliolis glabris vel subglabris, subtus parcissime breviter hirsutis.

LUZON, Subprovince of Ifugao, Mount Polis, *Bur. Sci. 19813 McGregor*, February, 1913: Subprovince of Lepanto, Mount Malaya, *For. Bur. 14496 Darling*, January, 1909.

The typical form of the species, which is well represented in the Bureau of Science herbarium by a large series of specimens from Mountain Province, Luzon, has rather densely ciliate-hirsute leaves. In the variety above proposed the leaves are nearly glabrous; otherwise the form is very similar to typical *Clematis leschenaultiana* DC.

MENISPERMACEAE

HYPSERPA Miers

ZANTHOXYLUM ? TRIPLINERVE Turcz. in Bull. Soc. Nat. Mosc. **36** [2] (1863) 597; F.-Vill. Novis. App. (1880) 35; Vid. Rev. Pl. Vasc. Filip. (1886) 74; Perk. Frag. Fl. Philip. (1905) 161 = **HYPSERPA CUSPIDATA** (Wall.) Miers in Ann. Nat. Hist. II **7** (1851) 40; Diels in Engl. Pflanzenreich **46** (1910) 206.

The status of Turczaninow's species has been doubtful, as from his description it is at once evident that the plant he described, having simple leaves, could not be a *Zanthoxylum*, as indicated by Perkins l. c. Doctor Perkins indicates that such a Province as "North Hows," cited by Turczaninow, does not exist in Luzon, and suggested that the plant may have come from Lord Howe's Island. Through the kindness of the director of the Botanical Institute of the University of Kharkoff, I have been able to examine Turczaninow's type which is preserved in the herbarium of that institution. The original label reads "Runner No. 2, Ilocos Norte, Island of Luzon, April, 1839, H. C.," with notes on the dissection of the flowers by Turczaninow. The plant is identical in all respects with *Cuming 1252*, localized by Cuming himself as from the Province of North Ilocos (= Ilocos Norte), which is *Hypserpa cuspidata* Miers; the specimen in Turczaninow's herbarium, type of *Zanthoxylum ? triplinerve* Turcz., is unquestionably a part of the same collection.

CAPPARIDACEAE

CAPPARIS Linnaeus

CAPPARIS AFFINIS sp. nov.

Species *C. sepiariae* affinis, differt foliis majoribus, usque ad 9 cm longis, coriaceis, nervis utrinque magis numerosis, utrinque circiter 8.

A scandent, armed shrub, apparently entirely glabrous. Branches pale greenish-yellow when dry, terete, stout, slightly zigzag, glabrous, or the younger ones very slightly pubescent. Leaves alternate, oblong, coriaceous, 8 to 9 cm long, 3 to 4 cm wide, pale yellowish-green when dry, brittle, the upper surface very smooth and strongly shining, the lower paler, dull, base rounded, apex retuse; lateral nerves about 8 on each side of the midrib, slender, indistinct, scarcely anastomosing, the reticulations obsolete or nearly so; petioles 5 to 7 mm long; spines stout, recurved, about 2 mm long. Inflorescence fascicled or umbellate, axillary, apparently few-flowered. Flowers not seen. Peduncles in fruit 3 mm long or less, each bearing from 2 to 4, long-pedicelled fruits, the pedicels about 1 cm long, the androgynophore as long as the peduncles. Fruit globose, about 8 mm in diameter when dry, the pericarp somewhat wrinkled, glabrous, pale, shining.

PALAWAN (Arricife Island, near the southern end of Palawan), *Bur. Sci. 21583 Escritor*, August 14, 1913.

A species with much the appearance of *Capparis sepiaria* Linn., but with much larger, quite glabrous, coriaceous, more numerously nerved leaves.

CAPPARIS PALAWANENSIS sp. nov.

Frutex suberectus, 2 ad 3 m altus, partibus junioribus plus minusve pubescens, ramis ramulisque inermis vel subinermis; foliis oblongo-ovatis, usque ad 11 cm longis, acuminatis, basi rotundatis, nervis utrinque 10 ad 12; floribus subterminalibus, solitariis vel binis; fructibus longissime pedunculatis, ellipsoideis ad globoso-obovoideis, circiter 1.5 cm diametro, extus pubescentibus.

A suberect shrub, 2 to 3 m high, the branches somewhat drooping or subscandent, unarmed, or with only few, scattered, short spines. Branches terete, glabrous, dark-colored, the branchlets yellowish-olivaceous, terete, slender, rather densely pubescent with short hairs. Leaves alternate, oblong-ovate, 9 to 11 cm long, 3.5 to 4.5 cm wide, chartaceous, base broadly rounded, narrowed in the upper one-third to the rather sharply acuminate apex, pale olivaceous, rather dull, and glabrous or very slightly pubescent on the upper surface, the lower surface much paler, slightly pubescent on the midrib and nerves; lateral nerves 10 to 12 on each side of the midrib, spreading, anastomosing, the reticulations lax; petioles densely pubescent, 2 to 4 mm long. Flowers subterminal, in the uppermost axils, solitary or in pairs,

not superposed (not seen). Peduncles in fruit about 4 cm long, slender, the androgynophore about as long as the peduncle, somewhat thicker and slightly thickened upward, the fruit ellipsoid to globose-obovoid, about 1.5 cm in diameter, nearly black when ripe, the pericarp distinctly pubescent.

PALAWAN, between Taytay and Lake Manguao, *Merrill 9459*, April 23, 1913, on forested dry slopes, altitude about 60 meters.

Probably as closely allied to *Capparis lobbiana* Turcz. as to any other species, but with much larger, differently shaped leaves, larger fruits, and unarmed or nearly unarmed branches.

CAPPARIS VENOSA sp. nov.

Frutex scandens, floribus exceptis glaber, spinis brevissimis, vix 1 mm longis; foliis oblongis vel elliptico-oblongis, chartaceis, usque ad 18 cm longis, acuminatis, basi acutis vel rotundatis, nervis utrinque circiter 7, prominentibus, anastomosantibus; floribus paucis, in racemis terminalibus dispositis, pedicellis in paribus seriatim dispositis supra nodis aculeatis sed defoliatis; petalis dense pubescentibus.

A scandent shrub, glabrous except the flowers, the branches terete, straw-colored when dry, the ultimate ones 2 to 3 mm in diameter, armed with very short spines at the nodes, the spines less than 1 mm in length. Leaves oblong to elliptic-oblong, 15 to 18 cm long, 5.5 to 7.5 cm wide, chartaceous or subcoriaceous, pale when dry, shining, the lower surface decidedly paler than the upper, the apex acuminate, the base acute or rounded; lateral nerves prominent, distinctly impressed on the upper surface, projecting on the lower, about 7 on each side of the midrib, curved and distinctly anastomosing, the reticulations rather lax; petioles 5 to 8 mm long. Racemes terminal, few-flowered, the flowers in pairs, seriate above the leafless nodes, but each node with a pair of minute spines, scattered, the pedicels about 2 cm long. Sepals 8 mm long, oblong-elliptic or elliptic, concave, acute, glabrous or nearly so. Petals obovate to broadly oblong-obovate, rather densely pubescent, rounded, about 12 mm long, 8 mm wide. Stamens numerous, their filaments up to 2.5 cm long; anthers oblong, 1.3 mm long. Gynophore glabrous, 1.5 cm long, bearing the glabrous, narrowly ovoid, 3 to 4 mm long ovary.

MINDANAO, District of Cotabato, near Lebak, *For. Bur. 14216 Whitford*, April, 1912, in dipterocarp forests at low altitudes.

A species probably as closely allied to *Capparis micracantha* DC. as to any other, but very different in many characters. The venation of the leaves and the inflorescence are characteristic.

NEPENTHACEAE

NEPENTHES Linnaeus

NEPENTHES BRACHYCARPA sp. nov.

Alte scandens, partibus junioribus inflorescentiisque exceptis glabra; inflorescentiis racemosis, pedicellis brevibus, 1-floris; operculum ascidii intus planum; foliis petiolatis, nervis longitudinalis circiter 2 utrinque, tenuibus, obscurissimis, basi angustatis, longe in petiolo decurrento-alatis, leviter amplexicaulibus, haud decurrentibus; capsulis brevibus, 6 ad 15 mm longis.

Scandent, 4 to 5 m high or more, glabrous except the dark brown pubescent very young parts and the racemes, the stems terete, brown, about 5 mm in diameter. Leaves alternate, spirally arranged, the lamina coriaceous, 12 to 14 cm long, 2 to 3 cm wide, brownish or olivaceous when dry, slightly shining, narrowed below and winging the 4 to 6 cm long petiole, the wings about 2 mm wide, about one-third amplexicaul at the base, apex acute or acuminate and extended as a long, slender tendril, the lateral longitudinal nerves at most 2 on each side of the midrib, very slender, obscure, or obsolete. Pitchers reddish, glabrous, or when young somewhat pubescent, about 9 cm long, 3 to 3.5 cm in diameter, cylindric-ventricose, dimorphous, those on young plants with two ventral wings which are about 5 mm wide and prominently lacerate-toothed, those on mature plants with the wings reduced to merely low ridges which are not all toothed, 0.5 mm wide and high, the base gradually narrowed into the tendril, the mouth oblique, 3 to 4 cm in diameter, ovate, dorsally produced into a short stalk, the peristome cylindric, equal, 2 to 3 mm in diameter, densely striate; operculum elliptic to elliptic-ovate, broadly rounded, base rounded or somewhat cordate, about 3.5 cm long, 2.5 cm wide, plane, not at all keeled or cristate, inside with numerous small, round glands. Racemes dark brown pubescent, the female ones in flower about 9 cm long and 1.5 cm wide, in fruit very long-peduncled, about 13 cm long and 3 cm wide, the peduncles up to 35 cm long. Pedicels 3 to 5 mm long, pubescent. Sepals elliptic, obtuse, 3 mm long, somewhat pubescent. Ovary narrowly ellipsoid, 3 mm long, densely ferruginous-pubescent. Capsules glabrous, oblong to lanceolate, 6 to 1.5 mm long.

PALAWAN, Silanga Peak, back of Silanga, *Merrill 9588* (type), *9615*, May 30, 1913.

The first specimen cited is with female flowers and mature, but old, fruits, while the second is a juvenile stage of what is apparently the same species, both being collected in the same place, on steep, dry, forested ridges at an altitude of from 250 to 400 meters.

The species is apparently most closely allied to *Nepenthes copelandii* Merr., of Mindanao, differing, however, in many characters. It resembles *Nepenthes alata* Blanco, at least the form I take to be a juvenile stage, but the type number has quite wingless pitchers. Good differential characters are its comparatively short capsules and its short-petioled flowers, together with its very obscurely nerved leaves, the lateral nerves, at times, being quite obsolete.

ROSACEAE

ANGELESIA Korthals

ANGELESIA SPLENDENS Korth. in Ned. Kruidk. Arch. 3 (1854) 384; Miq. Ann. Mus. Bot. Lugd. Bat. 3 (1867) 236; Boerl. & Koord. in Ic. Bogor. 1 (1901) *t. 96.*

Licania angelesia Blume Mél. Bot. (1855) no. 2, Flora 41 (1858) 256.
Trichocarya splendens Miq. Fl. Ind. Bat. 1[1] (1855) 358.
Chrysobalanus splendens Miq. l. c. in syn.
Parinarium nitidum Hook. f. Fl. Brit. Ind. 2 (1878) 310; King in Journ. As. Soc. Beng. 66[2] (1897) 284.

MINDANAO, Province of Surigao, *Piper 249*, April, 1911. SAMAR, *Bur. Sci. 17431 Ramos*, April, 1914, *Phil. Pl. 1696 Ramos.* PALAWAN, *Phil. Pl. 1224 Merrill, Elmer.* SIBUYAN, *Elmer 12130, 12214*, distributed as a new species of *Parinarium.*

I have examined the following extra-Philippine material: PENANG, *Curtis 14a, 147, Ridley s. n.* MALAY PENINSULA, Setul, *Ridley 1503.* BORNEO, Sarawak, Tabuan, *Native collector 784 Bureau of Science.*

I think that there can be no doubt as to the validity of Korthals's genus, which is well figured by Boerlage and Koorders l. c. The species and genus were based on material collected in Borneo by Korthals, and as Boerlage and Koorders explain, were joined by Miquel[4] with *Diemenia racemosa* Korth. to form the genus *Trichorcarya* Miq. Later Miquel himself[5] separated the two genera, which, as Boerlage and Koorders note, has been overlooked by later authors. Bentham and Hooker f.[6] retain Miquel's *Trichocarya* with two species, and Focke[7] maintains the genus *Angelesia* with 2 or 3 species. *Trichocarya splendens* Miq., the type of the genus *Trichocarya*, is identical with *Angelesia splendens* Korth., but Miquel's second species, *Trichocarya ? racemosa* Miq. (*Diemenia racemosa* Korth.) is, according to Boerlage and Koorders, identical with the earlier *Parastemon urophyllus* A. DC.

The only synonym I have added to the list given by Boerlage and Koorders is *Parinarium nitidum* Hook. f., which is manifestly identical with Korthals's species. Hooker cites in the original description "Malacca, *Griffith, Maingay* (Herb. Kew 619).-Distrib. Borneo;" King, among other specimens, cites "*Griffith 2047/1;*" while Boerlage and Koorders cite in their discussion *Griffith 2047*, and a part of their plate, the fruiting specimen, is drawn from Griffith's specimen. Hooker himself indicated *Parinarium nitidum* as the type of an unnamed subgenus. King includes the species

[4] Fl. Ind. Bat. 1[1] (1855) 358.
[5] Ann. Mus. Bot. Lugd. Bat. 3 (1867) 236.
[6] Gen. Plant. 1: 607.
[7] Engl. & Prantl Nat. Pflanzenfam. 3[3] (1888) 60.

in *Parinarium* with doubt, and expresses the opinion that, when mature fruits are known, a separate genus might be formed with advantage for the species, apparently not realizing that two generic names, *Angelesia* Korth. and *Trichocarya* Miq., had already been proposed for an identical species.

Angelesia splendens Korth. is represented by the following material: MALAY PENINSULA, Setul, *Ridley 15043:* Malacca, *Griffith 2047, Maingay 619, Derry 189, 1180:* Perak, *King's collector 8599, 8680, 8711.* PENANG, *Curtis 14a, 147, 853, King's collector 1274, 1472, Ridley s. n.* BORNEO, Sarawak, *Native collector 784, Bureau of Science;* southern Borneo, *Korthals.* SUMATRA, *Koorders,* and the Philippine material cited above.

PARINARIUM Aublet

PARINARIUM VILLAMILII sp. nov.

Arbor alta partibus junioribus inflorescentiisque exceptis glabra; foliis coriaceis, oblongis, acuminatis, usque ad 16 cm longis, nervis utrinque circiter 12, basi subtus 2-glandulosis, nervis reticulisque utrinque minute scaberulis, ramulis junioribus stipulisque longe adpresse ciliato-hirsutis, inflorescentiis axillaribus, racemosis (vel paniculatis?), adpresse pubescentibus; fructibus ellipsoideis, 2.5 ad 3 cm longis.

A tree reaching a height of 27 m, glabrous except the inflorescence and the younger parts. Branchlets slender, terete, dark reddish-brown and somewhat glaucous, the very young ones appressed-ciliate-hirsute with long, rather pale hairs, similar hairs on the stipules, younger petioles, and near the base of the leaf on the midrib beneath in young leaves. Leaves oblong, coriaceous, pale when dry, 12 to 16 cm long, 4 to 8 cm wide, rather prominently acuminate, the acumen obtuse, base acute to nearly rounded, with two small glands on the lower surface near the junction with the petiole; lateral nerves about 12 on each side of the midrib, prominent on the lower surface, curved, anastomosing, these and the reticulations minutely scaberulous on both surfaces; petioles 5 mm long or less, at maturity quite glabrous; stipules oblong-lanceolate, acute or obtuse, about 1 cm long, with scattered, appressed, long, pale hairs. Racemes (or panicles?) axillary, appressed-pubescent, in fruit up to 9 cm in length. Fruit ellipsoid, brown, 2.5 to 3 cm long (immature), prominently verruculose, the pedicels stout, pubescent, about 5 mm long, the persistent sepals pubescent on both surfaces, the tube villous within, stamens apparently at least 30.

MINDANAO, District of Zamboanga, Margosatubig, *For. Bur. 21863 Villamil,* June 9, 1914, forested slopes, altitude about 80 meters.

Among the Philippine species most closely allied to *Parinarium laurinum* A. Gray, but entirely different in vegetative characters.

PARINARIUM BICOLOR sp. nov.

Arbor circiter 10 m alta, subtus foliis ramulis inflorescentiisque dense albido- vel ferrugineo-villosis; foliis coriaceis, usque ad 7 cm longis, oblongo-ellipticis, basi acutis ad subrotundatis, apice breviter obtuse acuminatis, supra castaneis, nitidis, glabris, subtus albidis vel subferrugineis, densissime tomentosis villosisque, nervis utrinque circiter 15, prominentibus; inflorescentiis terminalibus confertis, dense multifloris, usque ad 4 cm diametro, bracteis bracteolisque numerosis; floribus circiter 4 mm longis, petalis sepalisque subaequilongis.

A tree about 10 m high, the younger parts and inflorescence densely ferruginous-villous, the lower surface of the leaves very densely white- or subferruginous-tomentose and more or less villous. Branches dark-colored, terete, glabrous, the younger ones ferruginous. Leaves alternate, coriaceous, oblong-elliptic, 4 to 7 cm long, 2 to 3 cm wide, base rounded to subacute, apex shortly and obscurely blunt-acuminate, the upper surface castaneous, glabrous and shining when dry, when young somewhat ferruginous-tomentose, the lower surface white or subferruginous; lateral nerves about 15 on each side of the midrib, very prominent on the lower surface, nearly straight; petioles densely ferruginous-villous, 3 mm long or less; stipules inequilateral, deciduous, oblong acuminate, up to 7 mm long, somewhat pubescent. Panicles terminal, dense, many-flowered, densely ferruginous-tomentose, up to 4 mm in diameter. Flowers yellowish-brown, their pedicels short, densely villous, the bracteoles oblong-ovate, acuminate, pubescent, concave, about 4 mm long. Calyx about 4 mm long, densely ferruginous-villous, the lobes 5, oblong, acuminate, 1.2 to 2 mm long. Petals membranaceous, glabrous, about 2 mm long, oblong-obovate. Calyx-tube densely villous within. Style densely villous below, glabrous or nearly so above. Fruit hard, irregular, dark brown, somewhat ovoid, about 3 cm long and 2.3 cm in diameter, apex rounded.

MINDANAO, Province of Surigao (Gindituan Island), *For. Bur. 28022 Razon*, October 6, 1914, on slopes, altitude about 30 meters.

A species entirely different from the other Philippine representatives of the genus, well characterized by its small leaves and its indumentum. Its alliance is with the Malayan *Parinarium costatum* Blume.

PARINARIUM CORYMBOSUM (Blume) Miq. Fl. Ind. Bat. 1 [1] (1855) 356.

Maranthes corymbosa Blume Bijdr. (1825) 89.

Maranthes multiflora Korth. Verh. Nat. Gesch. Bot. (1839–42) 259, *t. 70*, fide Blume Mus. Bot. Lugd. Bat. 2: 98.

Parinarium griffithianum Benth. in Hook. Niger Fl. (1849) 334; Miq. l. c. 356; F.-Vill. Novis. App. (1880) 76; Vid. Sinopsis Atlas

(1883) 25, *t. 46, f. A;* Koord. & Valeton Bijdr. Boomsoort. Java 5 (1900) 334; Perk. Frag. Fl. Philip. (1904) 118; Whitford in Philip. For. Bureau Bull. 10 [2] (1911) 34, *pl. 14, 15.*

Grymania salicifolia Presl Epim. Bot. (1849) 193.

Parinarium salicifolium Miq. Fl. Ind. Bat. 1 [1] (1855) 357; F.-Vill. l. c. 76; Vid. Rev. Pl. Vasc. Filip. (1886) 121.

Parinarium multiflorum Miq. l. c. 356.

Parinarium racemosum Vid. Cat. Pl. Prov. Manila (1880) 29.

This species is very widely distributed in the Philippines, and is represented in the herbarium of the Bureau of Science by about 60 specimens, from all parts of the Archipelago from northern Luzon to southern Mindanao. What is manifestly the oldest specific name is here adopted, for Blume's species was reduced to *Parinarium griffithianum* Benth. by Koorders and Valeton, which reduction is apparently correct. Blume's name, being by far the oldest one, must be adopted. The species is a widely distributed one, extending from the Andaman Islands through Sumatra, Borneo, and Java to New Guinea and northern Australia.

PARINARIUM LAURINUM A. Gray Bot. Wilkes U. S. Explor. Exped. (1854) 490, *pl. 55;* K. Schum. & Lauterb. Fl. Deutsch. Schutzegeb. Südsee (1901) 341.

Parinarium scabrum Merr. in Philip. For. Bureau Bull. 1 (1903) 22, non Hassk.

Parinarium mindanaense Perk. Frag. Fl. Philip. (June, 1904) 119.

Parinarium racemosum Merr. in Govt. Lab. Publ. (Philip.) 17 (October, 1904) 19, non Vidal.

Parinarium curranii Merr. in Philip. Journ. Sci. 4 (1910) Bot. 264.

LUZON, Province of Albay, *For. Bur. 10575 Curran,* June, 1908. MASBATE, *Merrill 2614,* May, 1903 (type of *P. racemosum* Merr.-*P. curranii* Merr.). PALAWAN, Malampaya Bay, *For. Bur. 11253 Manalo,* January, 1908, *Merrill 7255,* September, 1910. MINDANAO, Province of Surigao, *Ahern 375:* Butuan Subprovince, La Paz, *Miller s. n.,* July, 1910: District of Davao, *Warburg 14484,* in herb. Berlin (type of *P. mindanaense* Perk.), *Elmer 11237, 12383.*

There appears to be no doubt as to the specific identity of all the Philippine material cited above, and equally as little doubt as to the identity of the Philippine form with *Parinarium laurinum* A. Gray. The type of *Parinarium laurinum* was from the Samoan Islands, and is well figured and illustrated by Gray. The species is also represented in the herbarium of the Bureau of Science by *Vaupel 237* from Samoa (distributed as *Parinarium insularum* A. Gray), a specimen that agrees perfectly with the original description and plate of *Parinarium laurinum* A. Gray, but not with *P. insularum* A. Gray. This specimen in all essential characters also agrees with the Philippine material.

Parinarium laurinum A. Gray is known from the Samoan, Fiji, Solomon, and Admiralty Islands, and in consideration of the general character of the Polynesian flora, its discovery in the Philippines is not at all surprising. A considerable number of species are known only from the Philippines and Polynesia, and a still greater number are represented in the two regions by very closely allied forms. In a collection of plants made in Samoa by Vaupel, which I have examined carefully, the similarity between the

constituents of the Samoan and Philippine flora is so very striking that Vaupel's entire collection might almost as well have been made at some point in the Philippines; the percentage of difference as to species is no greater between Vaupel's Samoan collection and the general run of the Philippine flora than is noted in current collections made in botanically unexplored parts of the Philippines as compared with the known flora of the Archipelago.

K. Schumann and Lauterbach note that oil produced by the fruits is used in the Solomon Islands for caulking the seams of boats; in the Philippines it is used by the natives of Agusan Valley, Mindanao, for water-proofing bamboo and rattan baskets. The following note was supplied by Dr. M. L. Miller, of the division of ethnology, Bureau of Science, and communicated by him with botanical specimens: "The fruit of the *tabon-tabon* tree, when mature, is full of a yellowish-white pulp, that has about the hardness of a camote (sweet potato). On being rubbed over a rough surface, such as a rattan plaiting, it fills the interstices, assuming a chocolate color and drying within an hour to a hardness that does not crack under a torrid sun. The coating of *tabon-tabon* on baskets, etc., is frequently darkened in color with charcoal."

Native names: *tambon-tambon* (Masbate); *batobon* (Palawan); *tabun-tabun* (Albay); *tabon-tabon* (Surigao, Agusan).

As to nomenclature, the oldest valid specific name applied to the Philippine form is *Parinarium mindanaense* Perk., the type of which I have examined in the Berlin herbarium. *Parinarium racemosum* Merr., published a few months later, and during the same year, is invalidated by *P. racemosum* Vid. (1880); *P. curranii* Merr. was proposed as a new name for *P. racemosum* Merr., non Vidal.

PYGEUM Gaertner

PYGEUM EUPHLEBIUM sp. nov.

Arbor 10 m alta, subtus foliis ad costa ramulis inflorescentiisque ferrugineo-villosis; foliis oblongis, coriaceis, usque ad 10 cm longis, integris, acuminatis, basi subacutis ad rotundatis, nervis utrinque 8 ad 10, supra impressis, subtus valde prominentibus, reticulis laxis, obscuris; racemis spiciformibus, brevibus, fasciculatis, 1 ad 1.5 cm longis, bracteolis deciduis, fructibus junioribus anguste ovoideis, plus minusve ferrugineo-villosis.

A tree about 10 m high, the young branches, inflorescence, petioles, and the leaves along the midrib on the lower surface rather prominently ferruginous-villous. Branches slender, terete, dark brownish-purple, glabrous. Leaves oblong, coriaceous, 7 to 10 cm long, 2 to 4 cm wide, the upper surface shining, brownish-olivaceous, the lower paler, brownish, the apex shortly and sharply acuminate, the base subacute to rounded, with one or two plane, dark-colored, small glands evident on the lower surface near the base; lateral nerves impressed on the upper surface, very prominent on the lower surface, 8 to 10 on each

side of the midrib, curved upward near the margins, scarcely anastomosing, the reticulations lax, obscure; petioles 7 to 10 mm long. Racemes short, ferruginous-villous, fascicled, spikelike, 1 to 1.5 cm long, usually two or three in a fascicle in the axils of leaves or of fallen leaves, the bracteoles small, deciduous; young fruit narrowly ovoid, 5 mm long, ferruginous-villous with scattered hairs, the rather slender style persistent.

MINDANAO, District of Lanao, Momungan, *For. Bur. 20619 Miranda*, May 20, 1913, along Agus River, sea level to 80 meters in altitude.

A species allied to *Pygeum merrillianum* Koehne, but entirely different from that form, well characterized by its ferruginous-villous, short, fascicled, spikelike racemes, its pubescent young fruit, indicating a pubescent ovary, and its very prominently nerved leaves.

PYGEUM MONTICOLUM sp. nov.

Arbor circiter 10 m alta, partibus junioribus ferrugineo-pubescentibus; foliis crasse coriaceis, oblongis, usque ad 10 cm longis, utrinque subaequaliter angustatis, apice acuminatis, basi acutis, eglandulosis; nervis utrinque circiter 8, subtus prominentibus; racemis axillaribus, solitariis, usque ad 5 cm longis; fructibus globosis, glabris vel subglabris, 2 cm diametro.

A tree about 10 m high, the younger parts, branchlets, young leaves, etc. rather densely ferruginous-villous. Branches terete, glabrous. Leaves thickly coriaceous, oblong or somewhat oblong-lanceolate, 8 to 10 cm long, 2.5 to 4 cm wide, entire, about equally narrowed to the distinctly acuminate apex and to the acute base, the basal glands none, the upper surface dark olivaceous, prominently shining, the lower paler, dull, very slightly pubescent along the midrib at maturity; lateral nerves about 8 on each side of the midrib, very prominent on the lower surface, somewhat ascending, distinctly anastomosing, the reticulations rather fine, distinct; petioles 1 to 1.5 cm long. Racemes axillary, solitary, up to 5 cm long, ferruginous-pubescent. Fruits globose, glabrous or nearly so, 2 cm in diameter.

LUZON, Province of Bataan, Mount Mariveles, *Whitford 1203*, April 7, 1905, forested slopes, altitude about 1,060 meters.

A species best characterized by its thickly coriaceous, eglandular leaves and its very large fruits.

PYGEUM MEGAPHYLLUM sp. nov.

Arbor parva, racemis exceptis glabra; foliis ellipticis vel ovato-ellipticis, chartaceis, circiter 20 cm longis, breviter acuminatis, basi subrotundatis vel subacutis, glandulis 2 magnis instructis; racemis solitariis, axillaribus vel in axillis defoliatis, 6 ad 9

cm longis, dense fulvo-pilosis; floribus in anthesis 1 ad 1.5 cm diametro.

A small tree about 8 m high, glabrous except the inflorescence. Branches brown, smooth, slender, terete, the ultimate ones 2 to 3 mm in diameter. Leaves elliptic or elliptic-ovate, chartaceous, brown when dry, the lower surface paler than the upper, somewhat shining, about 20 cm long, 10 cm wide, the apex rather broadly acuminate, the acumen blunt, the base rounded or subacute, sometimes a little decurrent, supplied at the junction with the petiole with a pair of very prominent oblong glands which are open on the lower surface, slightly projecting on the upper one; lateral nerves about 10 pairs, rather prominent; petioles 2 cm long. Racemes axillary, 6 to 9 cm long, rather densely pubescent with pale fulvous hairs; bracteoles oblong-lanceolate, acuminate, pubescent, 3.5 mm long, deciduous; pedicels about 2 mm long. Flowers white, in anthesis 1 to 1.5 cm in diameter. Calyx-tube funnel-shaped, 3 mm long, 4 mm in diameter at the throat, the lobes 6, ovate-lanceolate, somewhat acuminate, pubescent, 2 to 2.5 mm long. Petals 6, suborbicular to orbicular-ovate, 2 mm long, very densely pubescent on both surfaces. Stamens indefinite, the filaments 2 to 6 mm long. Ovary glabrous, ovoid; style 5 mm long.

LUZON, Province of Laguna, Dahican River back of San Antonio, *Bur. Sci. 14923 Ramos*, June, 1912.

A distinct species, well characterized by its unusually large leaves with their very prominent basal glands, and by its flowers which are considerably larger than those of any other known Philippine species.

LEGUMINOSAE

ORMOSIA Jack

ORMOSIA VILLAMILII sp. nov. § *Amacrotropis.*

Arbor circiter 25 m alta, glabra, inflorescentiis ignotis; foliis imparipinnatis, circiter 25 cm longis, foliolis circiter 7, alternis vel inferioribus subopppositis, chartaceis, nitidis, oblongis, usque ad 11 cm longis, obtuse acuminatis, basi rotundatis; leguminibus anguste oblongis, tenuibus, 11 cm longis, 2.5 ad 3 cm latis, seminibus 3 vel 4.

A tree about 25 m in height, quite glabrous so far as the material shows (inflorescence not seen). Branches slender, brownish, shining, terete, lenticellate. Leaves alternate, about 25 cm long, the rachis and petiole dark brown or nearly black when dry; leaflets usually 7, alternate, or the lower ones subopposite,

shining, mostly oblong, the lower surface a little paler than the upper one, 6 to 11 cm long, 3 to 4.5 cm wide, the base rounded, the apex blunt-acuminate, the acumen distinctly retuse; lateral nerves 5 to 7 on each side of the midrib, slender, not prominent; petiolules 4 to 5 mm long, the rachis bearing the terminal leaflet produced. Inflorescence and flowers not seen. Pods narrowly oblong, thin, pale brown or grayish, smooth and shining, about 11 cm long, 2.5 to 3 cm wide, acute or acuminate, base decurrent into a short stipe, the margins narrowly keeled, apparently tardily dehiscent, containing three or four seeds.

MINDANAO, District of Zamboanga, opposite Olutanga Island, *For. Bur. 13290 Foxworthy, DeMesa, & Villamil*, May 16, 1912, on forested slopes near the sea, altitude about 20 meters.

There is some doubt as to the correctness of referring the species to *Ormosia* in the absence of flowers, but it is probably correct, and probably referable to the section *Amacrotropis*. Its Moro name, *bahay*, is also significant, for in other parts of the Archipelago this is the common name of *Ormosia calavensis* Azaola. The seeds, in the specimens available, were destroyed by insects before the time of collection.

SINDORA Miquel

SINDORA INERMIS sp. nov.

Arbor alta, partibus junioribus leviter pubescentibus; foliolis 6, chartaceis vel subcoriaceis, usque ad 12 cm longis, subellipticis, breviter obtuse acuminatis, basi subacutis ad rotundatis aliquis inaequilateralibus; stipulis late acinaciformibus, 2 ad 2.5 cm longis; leguminibus compressis, inermis, inaequilateraliter subellipticis, circiter 7 cm longis et 5 cm latis, brevissime apiculatis.

A tall tree, the younger parts sparingly pubescent, otherwise glabrous (inflorescence not seen). Branches slender, terete, brown. Leaves about 25 cm long, each with 6 leaflets, the leaflets chartaceous to subcoriaceous, subelliptic, somewhat shining, brownish-olivaceous, 8 to 12 cm long, 5.5 to 6.5 cm wide, some of them more or less inequilateral, apex shortly and obtusely acuminate, base subacute to rounded; lateral nerves slender, 15 or more on each side of the midrib, both surfaces rather distinctly and densely subfoveolate-reticulate; stipules broadly scimitar-shaped, falcate, coriaceous, 2 to 2.5 cm long, shortly acuminate. Flowers not seen. Fruits compressed, somewhat inequilateral, about 7 cm long, 5 cm wide, brown, glabrous, with a short excentric apiculus at the apex, the valves unarmed, thickly coriaceous.

MINDANAO, District of Cotabato, Sapu, Sarangani Bay, *For. Bur. 23054 Ferraris*, October 3, 1914, growing at sea level near the mangrove, locally known as *gayugalo*, oil-producing like *Sindora supa*. A sterile specimen,

For. Bur. 23039 Ferraris from the same locality, dry slopes, altitude about 50 meters, probably represents the same species.

The species is decidedly similar to *Sindora supa* Merr. in its vegetative characters, but differs in having its pods entirely unarmed.

BURSERACEAE

CANARIUM Linnaeus

CANARIUM CAUDATIFOLIUM sp. nov.

Arbor glabra (floribus ignotis), circiter 10 m alta; foliis circiter 70 cm longis, foliolis 11, subcoriaceis, oblongis ad oblongo-lanceolatis, integris, usque ad 20 cm longis, apice caudato-acuminatis, basi acutis, plus minusve inaequilateralibus, in siccitate pallidis nitidis, nervis utrinque circiter 15, patulis, prominentibus; infructescentiis 22 cm longis, cymosis, longe pedunculatis; fructibus oblongo-ovoideis vel oblongis, haud angulatis, inaequilateralibus, 4 cm longis, obtusis, 1-locellatis, pericarpio crustaceo, in siccitate valde rugoso.

A glabrous tree (flowers unknown), about 10 m high, the branches and branchlets, petioles, petiolules, axis, and branches of the infructescence reddish-brown, with numerous small lenticels. Ultimate branches subterete, about 1 cm in diameter, longitudinally wrinkled when dry. Leaves alternate, about 70 cm long; leaflets 11, oblong to oblong-lanceolate, 15 to 22 cm long, 5.5 to 7 cm wide, entire, subcoriaceous, the apex prominently caudate-acuminate, the acumen 1.5 to 2 cm long, slender, blunt, the base acute or subacute, somewhat inequilateral, the upper surface pale and shining when dry, the lower a little browner than the upper; lateral nerves about 15 on each side of the midrib, prominent, spreading, somewhat curved upward, anastomosing, the reticulations lax; petiolules about 2 cm long. Infructescence axillary, about 22 cm long, cymose, the peduncles at least 12 cm long, above somewhat dichotomously branched, the pedicels about 1.5 cm long. Fruits oblong to oblong-ovoid, subterete, not at all angled, inequilateral, about 4 cm long, 1.6 cm wide, base rounded, apex obtuse, 1-celled, the pericarp crustaceous, yellowish, and prominently wrinkled when dry.

MINDANAO, Province of Surigao, Ilaya Mainit, *For. Bur. 22827 Ponce*, August 16, 1914, on semiopen slopes, altitude about 15 meters, locally known as *pilihanay*.

A species well characterized by its rather large, prominently caudate-acuminate, entire leaflets, its cymose infructescence, and its subterete, inequilateral, rather large fruits, the pericarp thin, crustaceous, and prominently wrinkled when dry. Its alliance is apparently with *Canarium nitens* Merr., although it is entirely different from that species.

POLYGALACEAE

XANTHOPHYLLUM Roxburgh

XANTHOPHYLLUM PSEUDOSTIPULACEUM sp. nov.

Arbor circiter 10 m alta, inflorescentiis exceptis glabra; foliis coriaceis, oblongis vel oblongo-ovatis, usque ad 7 cm longis, basi acutis, apice obtusis ad obtuse acuminatis, subtus pallidis, nervis vix prominentibus, axillis petiolorum squamis binis oblongis coriaceis 5 ad 7 mm longis instructis; racemis puberulis, nodis valde incrassatis; fructibus globosis, 1.5 cm diametro.

A tree about 10 m high, glabrous except the inflorescence. Branches terete, smooth, brown or yellowish-brown, quite glabrous. Leaves rather thickly coriaceous, oblong to oblong-ovate, 5 to 7 cm long, 1.5 to 2.5 cm wide, the base acute, apex obtuse to obtusely acuminate, the upper surface somewhat yellowish when dry, shining, the lower much paler but scarcely glaucous; lateral nerves about 7 on each side of the midrib, not prominent, anastomosing, the reticulations rather close; petioles 5 to 8 mm long; axillary scales stipulelike, oblong, coriaceous, closely appressed in pairs, 2 scales in each axil, oblong, obtuse, persistent, 5 to 7 mm long. Racemes terminal, simple, rarely panicled, puberulent, in fruit up to 6 cm long, the internodes very short, the nodes strongly thickened, each with a prominent scar of the fallen pedicel. Flowers not seen. Fruit globose, smooth, about 1.5 cm in diameter.

LUZON, Province of Isabela, Palanan Bay, *Bur. Sci. 21135 Escritor* (type), June, 1913: Province of Nueva Ecija, Mount Macasantol, *For. Bur. 22403 Alvarez*, February, 1911.

The species is strongly characterized by its unusually large, coriaceous, persistent, oblong, 5 to 7 mm long axillary scales and its comparatively small leaves. It does not appear to be closely allied to any previously described form, at least from the Philippines.

AQUIFOLIACEAE

ILEX Linnaeus

ILEX GUERREROII sp. nov. § *Aquifolium, Lemurenses.*

Frutex vel arbor parvus, glaber; foliis coriaceis, integris vel subintegris, oblongis vel oblongo-ellipticis, usque ad 7 cm longis, acutis, obscure acuminatis vel obtusis, nervis utrinque circiter 6, supra obsoletis; floribus ♀ axillaribus, fasciculatis, 4-meris, pedicellis circiter 4 mm longis, bibracteolatis; ovario 4-loculare.

A shrub or small tree, glabrous throughout. Branches terete, rather stout, somewhat wrinkled when dry, pale gray. Leaves

coriaceous, oblong to narrowly oblong-elliptic, shining when dry, 5 to 7 cm long, 1.5 to 2.8 cm wide, entire or sometimes obscurely and distantly subcrenulate, the apex acute, slightly acuminate, or blunt, the base usually somewhat decurrent-acuminate; nerves about 6 on each side of the midrib, obsolete above, spreading, anastomosing, the reticulations very few, lax; petioles 5 to 10 mm long. Pistillate flowers axillary, fascicled, two to six in each axil, the pedicels about 4 mm long, each with a pair of ovate, acuminate bracteoles at the lower one-fourth or one-third. Flowers 4-merous. Calyx-lobes about 1.5 mm wide, 1 mm long, rounded. Petals free, 3 to 3.5 mm long, about 2 mm wide, oblong-ovate, rounded. Staminodes about 2 mm long. Ovary rhomboid-ovoid, 4-celled; stigma large, sessile, 1.5 mm in diameter. Very immature fruit somewhat angled, wrinkled, 4 mm long, 4-celled.

LUZON, Province of Rizal, mountains back of San Mateo, comm. *Leon Guerrero,* 1910.

A species apparently allied to *Ilex sumatrana* Loesener, but quite different from that form.

ILEX SUBCAUDATA sp. nov. § *Thyrsoprinus, Indico-Malaicae.*

Frutex vel arbor parvus, glaber; foliis ovato-ellipticis, usque ad 7 cm longis, integris, subcoriaceis, siccitate nitidis, breviter petiolatis, utrinque acuminatis, apice subcaudatis, acuminibus obtusis, circiter 1 cm longis; racemis ♂ axillaribus, solitariis vel binis, quam folia paulo brevioribus; floribus 4-, rariter 5-meris.

An erect, glabrous shrub or small tree. Branches rather slender, terete, wrinkled when dry, reddish-brown or grayish, not lenticellate. Leaves scattered, the internodes 1 to 3.5 cm long, ovate-elliptic, subcoriaceous, shining when dry, not punctate or glandular, somewhat pale, 5 to 7 cm long, 2 to 3.5 cm wide, entire, the apex rather abruptly subcaudate-acuminate, the acumen about 1 cm long, blunt, straight or somewhat falcate, the base somewhat acuminate, the margins not, or very slightly, recurved; nerves about 6 on each side of the midrib, slender, not prominent, ascending, anastomosing, the reticulations lax; petioles 3 to 4 mm long; stipules, if present, very early deciduous. Staminate racemes solitary or in pairs in the leaf-axils, 3 to 5 cm long, each with from 10 to 20, slenderly pedicelled flowers, the pedicels 4 to 5 cm long, each subtended by a small, ovate, obtuse bracteole less than 1 mm long. Flowers 4-, rarely 5-merous. Calyx-lobes ovate, obtuse, 0.5 to 0.8 mm long. Corolla-tube 1 mm long, the lobes oblong-ovate, obtuse, 1.5 mm long. Anthers

0.8 mm long. Ovary rudimentary. Pistillate flowers and fruits unknown.

LUZON, Province of Rizal, mountains back of San Mateo, comm. *Leon Guerrero*, 1910.

A species probably as closely allied to *Ilex spicata* Bl. as to any other species, but abundantly distinct.

ILEX PACHYPHYLLA sp. nov. § *Byronia, Eubyronia.*

Species *I. cymosae* affinis, differt foliis crassissime coriaceis, apice late rotundatis vel obtusis retusisque, vix acuminatis, floribus majoribus, ovario 4- vel 5-locellato.

A tree about 10 m high, glabrous except the somewhat pubescent inflorescence. Branches terete, stout, dark-colored. Leaves very thickly coriaceous, elliptic to obovate-elliptic, 5 to 10 cm long, 2.5 to 6 cm wide, entire, the apex broadly rounded to obtuse, usually more or less retuse, never acuminate, the base somewhat narrowed, acute or a little decurrent-acuminate, the margins strongly revolute, the upper surface olivaceous when dry, somewhat shining, the lower shining, much paler; lateral nerves 7 or 8 on each side of the midrib, slender, not prominent, the reticulations obsolete or nearly so; petioles 1 to 1.5 cm long, dark reddish-brown. Inflorescence cymose, sparingly cinereous-pubescent, the cymes in the upper axils pseudo-terminal, many-flowered, 2 to 5 cm long and wide. Flowers white, 5-merous, the pedicels and calyx somewhat puberulent, the calyx-lobes orbiculate-ovate, about 1.5 mm long, somewhat serrate-lacerate. Petals 5, oblong to oblong-ovate, rounded, about 3 mm long. Ovary 4- or 5-celled, glabrous, oblong, narrowed upward. Young fruit narrowly ovoid.

LUZON, Province of Tayabas, Mount Binuang, back of Infanta, *Bur. Sci. 9400 Robinson*, August 28, 1909, in the mossy forest, altitude about 980 meters.

ILEX BRUNNEA sp. nov. § *Thyrsoprinus, Indico-Malaicae.*

Frutex ut videtur epiphyticus, glaber, ramis ramulisque pallidis; foliis alternis, integris, coriaceis, oblongo-ovatis ad elliptico-lanceolatis, utrinque acuminatis vel basi acutis, usque ad 5 cm longis, petiolatis, in siccitate nitidis, brunneis, nervis lateralibus utrinque circiter 6, tenuibus, indistinctis; inflorescentiis ♂ axillaribus, solitariis, racemosis, racemis numerosis, multifloris, 2 ad 4 cm longis; floribus 4- vel 5-meris, petalis 2 mm longis.

Apparently an epiphytic shrub, quite glabrous or the racemes very slightly and obscurely pubescent. Branches pale gray, terete, slightly wrinkled when dry, the branchlets similar, somewhat angled, 1 to 1.2 mm thick. Leaves alternate, 3 to 5 cm

long, 1.4 to 3 cm wide, oblong-ovate to elliptic-lanceolate, about equally narrowed to the somewhat blunt-acuminate apex and to the acute or somewhat acuminate base, entire, coriaceous, when dry strongly shining on the upper surface, a little paler on the lower surface, uniformly dark brown, the lower surface very minutely, densely, and obscurely puncticulate, and with few, scattered, larger, dark glands; lateral nerves about 6 on each side of the midrib, very slender, obscure, anastomosing, the reticulations obsolete or nearly so; petioles about 5 mm long. Male racemes axillary, solitary, rarely 2 in an axil, numerous, 2 to 4 cm long, many-flowered, glabrous or very obscurely and sparingly pubescent, the flowers sometimes solitary at the nodes of the racemes, more often in fascicles of from 2 to 6, their pedicels slender, up to 5 mm long, the bracteoles narrowly ovate, 0.5 mm long. Flowers white, 4- and 5-merous in the same raceme. Calyx glabrous, about 2.5 mm in diameter, the lobes broadly elliptic-ovate to suborbicular, broadly rounded, 0.5 mm long. Petals narrowly oblong, 2 mm long, rounded or obtuse, glabrous. Filaments 2 mm long; anthers somewhat ovoid, 0.8 mm long.

LUZON, Province of Tayabas, Mount Pular, *Bur. Sci. 19461 Ramos*, January 15, 1913.

Said by the collector to grow on trees at the summit of the mountain. Most closely allied to *Ilex halconensis* Merr., from which it differs in its smaller, obscurely nerved, brown leaves, more numerous racemes, and smaller flowers.

CELASTRACEAE

MICROTROPIS Wallich

MICROTROPIS PLATYPHYLLA sp. nov.

Arbor glabra; foliis coriaceis, in siccitate pallidis, usque ad 20 cm longis, petiolatis, breviter acuminatis, basi decurrento-acuminatis, nervis utrinque 10 ad 12; cymis axillaribus, extra-axillaribusque, pedunculatis, usque ad 2.5 cm longis, multifloris, floribus 5-meris, sessilibus, capitato confertis; capsulis ellipsoideis, acutis vel apiculato-acuminatis, circiter 1.5 cm longis.

Apparently a tree, quite glabrous. Branches terete, reddish-brown or pale when dry, the tips of the branchlets somewhat compressed. Leaves large, coriaceous, pale, and somewhat shining when dry, the lower surface somewhat brownish, 12 to 20 cm long, 5.5 to 12 cm wide, subequally narrowed at both ends, elliptic-ovate, apex shortly and sharply acuminate, base decurrent-acuminate; lateral nerves 10 to 12 on each side of the midrib, slender, anastomosing, the reticulations rather close, fine, distinct; petioles stout, 1.5 to 2.5 cm long. Cymes axillary and

extra-axillary, peduncled, mostly 3-branched, up to 2.5 cm long, each subtended by several, coriaceous, linear bracts 2 to 5 mm in length. Flowers numerous, 5-merous, capitate at the tips of the branches, the heads up to 7 mm in diameter. Sepals obovate-orbicular, concave, externally prominently wrinkled-reticulate, about 2 mm in diameter, glabrous except the somewhat furfuraceous-incised margins. Corolla about 3.5 mm long, the tube short, the lobes elliptic-obovate, rounded, about 2 mm long, glabrous; filaments 1 mm long; anthers about 0.5 mm long. Ovary brown, glabrous, 2 mm in length. Capsule apparently somewhat fleshy when fresh, ellipsoid, about 1.5 cm long, 2-valved, the pericarp thickly coriaceous, apex acute or apiculate-acuminate; seed solitary, about 1 cm long, brown, and much wrinkled when dry.

LUZON, Province of Rizal, Montalban, *Loher 5779* (type), in flower, March, 1906, *5774*, in fruit, July, 1905.

A species readily recognizable by its unusually large leaves.

EUONYMUS Linnaeus

EUONYMUS OLIGANTHUS sp. nov.

Arbor glabra circiter 8 m alta; foliis chartaceis ad subcoriaceis, oblongo-oblanceolatis vel oblongo-ellipticis ad obovatis, usque ad 10 cm longis, pallidis, nitidis, sursum plus minusve serrato-crenulatis, utrinque subaequaliter angustatis, basi cuneatis, apice breviter obtuse acuminatis, nervis utrinque circiter 6, tenuibus; cymis axillaribus, tenuibus, longe pedunculatis, usque ad 9 cm longis, dichotomis, paucifloris; fructibus obovoideis, circiter 6 mm longis, vix sulcatis, laevis.

A glabrous tree about 8 m high, the branches pale yellowish-green, slender, terete. Leaves opposite, chartaceous to subcoriaceous, pale yellowish-green on both surfaces when dry, shining, oblong-elliptic to oblong-oblanceolate or obovate, 6 to 10 cm long, 2 to 4.5 cm wide, subequally narrowed to the cuneate base and to the shortly broad-acuminate apex, the upper part distinctly serrate-crenulate with small distant teeth, below entire; lateral nerves about 6 on each side of the midrib, slender, ascending, anastomosing, the reticulations lax, obscure; petioles 4 to 7 mm long. Cymes axillary, slender, few-flowered, dichotomous, in fruit up to 9 cm long. Flowers mostly in groups of threes at the tips of the branchlets, the very young buds obovoid, sepals and petals more or less ciliate, the latter at maturity possibly lacerate. Mature fruits crimson, smooth, obovoid when dry, about 6 mm long, somewhat apiculate by the persistent style, not or very obscurely longitudinally sulcate when dry, when

fresh not at all so, the persistent calyx thickly coriaceous, 4 to 5 mm in diameter, the lobes reniform, 2 mm long, about 3 mm wide, glabrous.

LUZON, Benguet Subprovince, Baguio, *Merrill 9644*, May, 1914, in thickets, limestone region, Sablan trail, altitude about 1,300 meters.

A species allied to *Euonymus viburnifolius* (Juss.) Merr. (*E. philippinensis* Merr.), differing in its smaller leaves, slender, elongated, very few-flowered cymes, and smaller fruits which are not sulcate or lobed.

GLYPTOPETALUM Thwaites

GLYPTOPETALUM LOHERI sp. nov.

Frutex vel arbor glabra; foliis subcoriaceis, ellipticis ad elliptico-ovatis, integris, breviter petiolatis, usque ad 10 cm longis, in siccitate pallidis, acuminatis, basi acutis, nervis utrinque 5 vel 6, tenuibus, obscuris, reticulis subobsoletis; cymis axillaribus, brevibus, paucifloris; fructibus globosis, 6 ad 10 mm diametro, 1- ad 4-locellatis.

A glabrous shrub or small tree, the branches terete, reddish-brown, the younger ones pale straw-colored. Leaves rather unequal in size, opposite, subcoriaceous, pale when dry, elliptic to ovate-elliptic, 6 to 10 cm long, 3 to 6 cm wide, subequally narrowed to the acute base and to the sharply acuminate apex, shining, entire; lateral nerves 5 or 6 on each side of the midrib, slender, obscure, the reticulations nearly obsolete; petioles 3 to 4 mm long. Cymes axillary, short, the peduncles 1 cm long or less, unbranched or with two very short branchlets. Flowers apparently sessile, crowded, few. Fruits globose, 6 to 10 mm in diameter, not sulcate, 1- to 4-celled, 1- to 4-seeded, the pericarp pale when dry, thickly coriaceous; seeds brown, about 7 mm long, the apical one-third surrounded by a thin, membranaceous, brittle, brown aril. Persistent sepals coriaceous, reniform, 4, entire, 2 to 3 mm wide.

LUZON, Province of Rizal, Montalban, *Loher 5765* (type), *5796*, February and December, 1904.

A species characterized by its pale, obscurely nerved leaves, its nearly obsolete reticulations, and its globose, not sulcate fruits.

GLYPTOPETALUM MARIVELENSE sp. nov.

Arbor parva, glabra, 3 ad 7 m alta; foliis oblongis ad oblongo-lanceolatis, chartaceis ad subcoriaceis, usque ad 13 cm longis, in siccitate pallidis, utrinque aequaliter angustatis, basi acutis, apice acuminatis, margine crenulato-serrulatis, nervis utrinque 6 vel 7, tenuibus, laxe anastomosantibus, reticulis distinctis, laxis; inflorescentiis axillaribus, tenuibus, usque ad 10 cm longis, plerumque breviter furcatis, ut videtur paucifloris; fructibus de-

presso-globosis, circiter 1.5 cm diametro, in siccitate brunneis, rugosis, 3- vel 4-locellatis, sepalis 4, persistentibus integris.

A shrub or small tree 3 to 7 m high, quite glabrous. Branches terete, slender, straw-colored or yellowish-green. Leaves opposite, chartaceous to subcoriaceous, oblong to oblong-lanceolate, pale and shining when dry, 7 to 13 cm long, 2.5 to 4.5 cm wide, subequally narrowed to the acute base and the shortly acuminate apex, the margins distinctly crenulate-serrate, the midrib very prominent; lateral nerves 6 or 7 on each side of the midrib, slender, laxly anastomosing, the reticulations slender, lax; petioles about 5 mm long. Inflorescence axillary, solitary, slender, usually forked near the apex, apparently few-flowered, up to 10 cm long in fruit, the bracts in pairs, lanceolate, acuminate, about 1.5 mm long. Flowers 4-merous. Fruits depressed-globose, brown when mature, about 1.5 cm in diameter, 3- or 4-celled, the pericarp coriaceous, wrinkled. Seeds 1 in each cell, attached near the apex of the cell, brown, about 8 mm long, the upper one-third surrounded by a thin brown aril.

LUZON, Province of Bataan, Mount Mariveles, *Elmer 6644* (type), November, 1904, *Whitford s. n., For. Bur. 2639 Meyer*, February, 1905 (the two latter with mature fruits): Province of Tayabas, *For. Bur. 10306 Curran*, April, 1908. From this can scarcely be distinguished *For. Bur. 6457 Everett*, from Cebu, February, 1907, and this specimen probably represents a form of the same species. In forests, altitude about 800 meters.

Duplicates of some of the above specimens were studied by me in the Kew Herbarium in December, 1907, and the memorandum then made was attached to one of the sheets in the herbarium of the Bureau of Science to the effect that the material represented a new species of *Euonymus;* later Mr. Elmer added the specific name *marivelensis* (sub. *Euonymus*) to our specimen of his *No. 6644*. A further study of the material leads me to consider that the species should be treated under the genus *Glyptopetalum*.

Var. **EUPHLEBIUM** var. nov.

A typo differt foliis valde nervosis, nervis, lateralibus reticulisque primariis subtus admodum prominentibus.

LUZON, Province of Zambales, Mount Tapulao, *For. Bur. 8108 Curran & Merritt*, December 15, 1907, in forests, altitude 100 to 1,400 meters.

ICACINACEAE

PHYTOCRENE Wallich

PHYTOCRENE OBOVOIDEA sp. nov.

Frutex alte scandens; foliis ovatis, coriaceis, glabris, in siccitate pallidis, usque ad 16 cm longis, acuminatis, integris, basi cordatis, 5-nervis, nervis lateralibus utrinque 3 vel 4, subtus valde prominentibus; capitulis ♀ binis, pedunculatis, globosis, circiter 2 cm

diametro, floribus 4-meris, sub fructu globosis, circiter 10 cm diametro, fructibus obovoideis vel oblongo-obovoideis, circiter 3.5 cm longis, apice abrupte rotundatis, depressis, abrupte brevissime apiculatis, densissime retrorse hirsutis.

A scandent shrub apparently of large size, the fruit-bearing branches up to 1.5 cm in diameter, pale brownish, prominently wrinkled when dry. Leaves ovate, coriaceous, pale, 12 to 16 cm long, 7 to 10 cm wide, entire, the upper surface glabrous, shining, the lower surface paler, glabrous, apex acuminate, base prominently cordate; basal nerves 5, the lateral ones about 4 pairs (or 3 above the base), very prominent, looped-anastomosing near the margins, the reticulations very distinct; petioles 5 to 7 cm long, very slightly hirsute. Female heads, just after anthesis, in pairs, apparently from the axils of fallen leaves, brown, globose, about 2 cm in diameter, their peduncles brown-hirsute, up to 4 cm in length. Flowers 4-merous, the calyx 4 to 5 mm long, lobes broadly ovate, acute or somewhat acuminate, up to 1.5 mm long, externally densely appressed-hirsute. Ovaries densely hirsute, when slightly developed (6 to 8 mm long) distinctly 3- or 4-toothed at the apex, the base narrowed. Heads in fruit (immature) globose, 8 to 10 cm in diameter, brown, the drupes very numerous, obovoid to oblong-obovoid, about 3.5 cm long, the apex up to 2 cm in diameter, angular by mutual pressure, gradually narrowed from the apex to the base, the apex itself abruptly rounded, usually distinctly depressed, and with a short, stout, blunt apiculus 2 mm long or less, all parts very densely hirsute with stiff, brown, appressed, reflexed hairs.

BILIRAN, *Bur. Sci. 18832 McGregor*, June 28, 1914, in forests.

This species is manifestly allied to *Phytocrene blancoi* (Azaola) Merr., which in turn is doubtfully distinct from *Phytocrene macrophylla* Blume; it differs, however, in its leaves being glabrous beneath, and in its entirely differently shaped drupes which are not gradually narrowed upward to the tip, but are obovoid or oblong-obovoid, abruptly rounded and depressed, gradually narrowed from the apex to the base. In the shape of its drupes it is equally distinct from *Phytocrene dasycarpa* Miq.

TILIACEAE

COLUMBIA Persoon

COLUMBIA SUBINTEGRA sp. nov.

Arbor circiter 35 m alta, inflorescentiis exceptis glabra; foliis ovatis ad oblongo-ovatis, coriaceis, usque ad 17 cm longis, utrinque glabris, nitidis, concoloribusque, integris vel leviter undulatis, aequilateralibus, basi late rotundatis, apice acuminatis; paniculis terminalibus, pyramidatis, pubescentibus; fructibus 2 cm diametro, suborbicularis, 5-alatis.

A tree about 35 m high, glabrous except the inflorescence. Branches slender, terete, brownish. Leaves coriaceous, equilateral, ovate to oblong-ovate, 14 to 17 cm long, 7 to 10 cm wide, of the same color, brownish and shining on both surfaces, entirely glabrous, the base broadly rounded, the apex acuminate, the margins entire or somewhat undulate, or even obscurely undulate-toothed in the upper part; nerves 6 on each side of the midrib, prominent, the reticulations slender, but distinct; petioles 2 to 2.5 cm long. Panicles terminal, pyramidal, uniformly pubescent, about 25 cm long, the branches scattered, the lower ones 10 cm long. Flowers not seen. Fruit orbicular in outline (lateral view), 2 cm in diameter, slightly pubescent or becoming glabrous, somewhat retuse at both base and apex, equally 5-winged, the wings about 8 mm wide.

MINDANAO, District of Zamboanga, Talisay, *For. Bur. 13776 Foxworthy, DeMesa, & Villamil*, June 18, 1912, in forests, altitude about 20 meters.

The species is locally known as *malacayan* a name applied also to other unrelated species, and is allied to *Columbia longipetiolata* Merr. of Luzon, from which it differs in its entire or nearly entire leaves. The fruit is red when fresh, the bark very tough and stringy as in other species of the genus, and the wood has a slightly pungent odor.

THEACEAE

TERNSTROEMIA Mutis

TERNSTROEMIA JAPONICA Thunb. in Trans. Linn. Soc. 2 (1794) 335; Dyer in Hook. f. Fl. Brit. Ind. 1 (1874) 280.

Adinandra coriacea Elm. Leafl. Philip. Bot. 1 (1908) 322.

LUZON, Province of Tayabas, Lucban (Mount Banajao), *Elmer 7438, 9214:* Province of Laguna, Mount San Cristobal, *Copeland*, May, 1908: Province of Zambales, Mount Tapulao, *For. Bur. 8075 Curran & Merritt, Bur. Sci. 4696, 5077 Ramos.* MINDORO, Mount Halcon, *For. Bur. 4473 Merritt*, June, 1906. PALAWAN, Mount Victoria, *Bur. Sci. 646 Foxworthy*, March, 1906.

This species is widely distributed, extending from Japan and China to the mountains of India, Ceylon, and Sumatra. The Philippine material, while variable, agrees rather closely in all essential characters with specimens from Japan, Ceylon, and China. The species described by Mr. Elmer as *Adinandra coriacea* is a typical *Ternstroemia* in all respects.

GUTTIFERAE

CALOPHYLLUM Linnaeus

CALOPHYLLUM FERRUGINEUM sp. nov. § *Inophyllum.*

Arbor alta, ramis ramulisque crassis, partibus junioribus inflorescentiisque dense ferrugineo-pubescentibus; foliis crassissime coriaceis, oblongis, usque ad 10 cm longis, in siccitate pallidis, nitidis, basi acutis, apice obtusis ad obscure acuminatis, subtus

leviter ferrugineo-pubescentibus; inflorescentiis terminalibus, paniculatis, circiter 15 cm longis, bracteolis oblongo-obovatis ad lanceolatis, 1.5 ad 2 cm longis, deciduis; sepalis 4; petalis 6.

A tall tree with stout branches, the ultimate branchlets stout, ferruginous-pubescent, 4 to 5 mm in diameter, reddish-brown. Leaves thickly coriaceous, mostly oblong, about 10 cm long, 4 to 5 cm wide, base acute, the apex obscurely acuminate, obtuse or sometimes rounded, pale when dry, the upper surface shining, the lower more brownish-yellow and, at least when young, sparingly ferruginous-pubescent; nerves spreading, rather distinct, about 16 to a centimeter; petioles dark brown, pubescent, about 1.5 cm long. Inflorescence a terminal panicle, all parts very densely ferruginous-pubescent, in nearly mature bud up to 15 cm long, many-flowered, bipinnately paniculate, each flower subtended by a very thick, densely pubescent, deciduous, oblong-oblanceolate to oblong-obovate bracteole 1.5 to 2 cm in length, the pedicels about 1 cm long. Sepals 4, densely pubescent, concave, the two outer ones about 10 mm long and 8 mm wide, the two inner ones orbicular, about 1 cm in diameter. Petals 6, in bud suborbicular, very slightly pubescent. Stamens very numerous. Ovary glabrous.

LUZON, Province of Laguna, in forests back of San Antonio, *Bur. Sci. 20545 Ramos*, February, 1913.

For the genus a rather characteristic species. It is apparently allied to *Calophyllum blancoanum* Pl. & Tr., from which it differs in its very densely ferruginous-pubescent inflorescence, younger branches, and to a less degree the lower surfaces of its leaves, in its prominent bracteoles which are up to 2 cm in length, and in its thickly coriaceous, more coarsely nerved, rather differently shaped leaves.

GARCINIA Linnaeus

GARCINIA NERVOSA Miq. Ann. Mus. Lugd. Bat. 1 (1863–64) 208; King in Journ. As. Soc. Beng. 59 [2] (1890) 169.

Stalagmites ? nervosa Miq. Fl. Ind. Bat. Suppl. (1861) 496.

PALAWAN, near Taytay, *Merrill 9387*, May, 1913, in bamboo thickets at about sea level. Probably referable here is a single specimen from the Province of Camarines, Luzon, *For. Bur. 21750 Fischer*, but this specimen has leaves 65 cm long and 25 cm wide, the base broadly rounded and distinctly cordate.

The species is new to the Philippines. Perak, Singapore (*Ridley 5966!*), Malacca, and Sumatra.

OCHROCARPUS Thouars

OCHROCARPUS RAMIFLORUS sp. nov.

Arbor parva, glabra; foliis oppositis, oblongis, subcoriaceis, usque ad 25 cm longis, in siccitate pallidis, basi acutis ad rotun-

datis, apice acutis vel breviter acuminatis, utrinque obscure foveolatis, subtus plus minusve glandulosis, nervis primariis utrinque 16 ad 20, tenuibus, quam secundariis reticulisque vix magis distinctioribus; floribus in ramis fasciculatis, pedunculis sub fructu 3 ad 4 cm longis.

A small tree about 5 m high, quite glabrous. Branches terete, pale, the younger ones brownish-yellow or yellow, somewhat compressed or angled, wrinkled when dry. Leaves opposite, oblong, subcoriaceous, 15 to 25 cm long, 6 to 9 cm wide, base rounded to acute, apex acute or shortly acuminate, margins recurved, both surfaces pale when dry, shallowly foveolate, the foveolæ on the lower surface often glandular; primary lateral nerves very slender, obscure, 16 to 20 on each side of the midrib, scarcely more distinct than are the secondary nerves and the reticulations; petioles wrinkled, 1.5 to 2 cm long. Flowers fascicled on the branches below the leaves, the subpersistent petals oblong, about 5 mm long, the stamens very numerous, about 6 mm long. Young fruits subglobose, about 1.5 cm in diameter, much wrinkled when dry, brownish, apparently when mature 1-celled and 1-seeded, when young at least 2-celled.

LUZON, Province of Camarines, Madadagat River, *For. Bur. 22795 Tabat*, August 5, 1913, on the banks of the river.

The first representative of the genus to be found in the Philippines, *Ochrocarpus pentapetalus* F.-Vill., based on *Tovomita pentapetala* Blanco being a *Calophyllum* and a synonym of *C. amplexicaule* Choisy. *Ochrocarpus ramiflorus* appears to be most closely allied to *O. siamensis* T. Anders. from which it differs in its acute or acuminate, fewer nerved leaves and longer pedicels.

FLACOURTIACEAE

HOMALIUM Jacquin

HOMALIUM OBLONGIFOLIUM sp. nov. § *Myriantheia.*

Arbor circiter 35 m alta, inflorescentiis exceptis glabra; foliis oblongis, usque ad 30 cm longis, coriaceis, nitidis, breviter acuminatis, nervis utrinque circiter 15; paniculis amplis, folia subaequantibus, axillaribus subterminalibusque, pubescentibus; floribus 7-meris, sepalis quam petalis subduplo longioribus; staminibus 21.

A tree 35 to 40 m high, glabrous except the inflorescence. Branches terete, lenticellate, dark-colored when dry. Leaves oblong, 20 to 30 cm long, 7 to 11 cm wide, entire, coriaceous, shining, the lower surface a little paler than the upper when dry, entire, shortly acuminate, base acute; lateral nerves about

15 on each side of the midrib, slender, distinct, anastomosing; petioles 1.5 to 2 cm long. Panicles axillary and subterminal, ample, many-flowered, open, about as long as the leaves, branched from the base, the lower branches sometimes 25 cm in length, all parts rather densely gray-pubescent. Perianth-tube funnel-shaped, 4 mm long, somewhat hirsute. Sepals 7, when fully grown 6 to 7 mm long, about 1.8 mm wide, obtuse, pubescent, oblong-oblanceolate. Petals 7, oblong, obtuse, pubescent, about 4 mm long. Stamens 21, in groups of three each opposite the petals; filaments filiform, 2.5 to 3 mm long, very slightly pubescent; anthers 0.3 mm long. Ovary densely hirsute, the styles 1 to 1.5 mm long.

MINDANAO, District of Zamboanga, Talisay, *For. Bur. 13781 Foxworthy, DeMesa, & Villamil* (type), June 18, 1912, in forests, altitude about 30 meters; near Port Banga, *For. Bur. 15216 Klemme*, July, 1910, sterile specimen.

A species most closely allied to *Homalium luzoniense* F.-Vill., but well characterized by its oblong entire leaves.

The specimen collected by Klemme consists of leaves only, taken from sprouts. One leaf is entire, 40 cm long and 14 cm wide, while the other, a more juvenile form, is 40 cm long and 20 cm wide, the margins being distinctly undulate-toothed.

SCOLOPIA Schreb.

Most of the recently collected Philippine material of the genus Scolopia has been referred to *Scolopia crenata* Clos, and to *S. luzonensis* (Presl) Warb. While Briquet's paper on the genus has been known to me for some years, it has only recently become available.[8] Following Briquet in his interpretation of the group of species closely allied to *Scolopia crenata* Clos, in which he is doubtless correct, the known Philippine forms may be disposed of as follows:

SCOLOPIA LUZONENSIS (Presl) Warb. in Engl. & Prantl Nat. Pflanzenfam. 3[6a] (1893) 30, *f. 11;* Briq. in Ann. Conserv. Jard. Bot. Genève 2 (1908) 45; Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 98.

Dasianthera luzonensis Presl Rel. Haenk. 2 (1835) 90, *t. 66.*
Phoberos dasyanthera Benn. Pl. Jav. Rar. (1844) 192; F.-Vill. Novis. App. (1880) 12.
Banara racemosa Blanco Fl. Filip. (1837) 425.
Flacourtia corollata Blanco l. c. ed. 2 (1845) 559.
Flacourtia crenata F.-Vill. Novis. App. (1880) 12; Vid. Rev. Pl. Vasc. Filip. (1886) 48; Sinopsis Atlas (1883) 13, *t. 7, f. B,* non Clos.
Phoberos sp. Turcz. in Bull. Soc. Nat. Mosc. 27 (1854) 333.
Scolopia rhinanthera F.-Vill. Novis. App. (1880) 12, non Clos.

[8] Briquet, J. Remarques sur les espèces asiatiques du genre Scolopia Schreb., *Ann. Conserv. Jard. Bot. Genève* 2 (1908) 41–47.

This species is common and widely distributed in the Philippines, and to it should be referred most of the Philippine material distributed from the Bureau of Science as *Scolopia crenata* Clos and as *S. luzonensis* Warb. It is well characterized by its ciliate anther-appendages.

I think it probable that *Banara brevifolia* Blanco Fl. Filip. (1837) 426 = *Flacourtia parvifolia Blanco* Fl. Filip. ed. 2 (1845) 560 should also be referred here. Blanco's description is altogether too short and incomplete properly to determine the plant he had in mind, and of which he saw no flowers. F.-Villar has reduced it to *Scolopia dasyanthera* Benn., which, if correct, would place it under *Scolopia luzonensis* Warb., for Bennett's designation is only a new name for the plant originally described by Presl as *Desianthera luzonensis*. This fact I overlooked at the time I worked over the determinations of Blanco's species, which accounts for my statement[9] that *Scolopia dasyanthera* Benn. was a species unknown from the Philippines.

Just how constant are the characters selected by Briquet in distinguishing the closely allied forms that have, for the most part, been reduced at one time or another to form a comprehensive species, *Scolopia crenata* Clos, remains to be seen. In our rich Philippine collections evidences of intergrading forms occur, that to a greater or less degree invalidate the key characters adopted by Warburg and by Briquet in distinguishing the sections *Adenoscolopia* and *Sphenoscolopia*. *Elmer 5625, 6363*, from Benguet Subprovince, Luzon, and *Bur. Sci. 10376 McGregor*, from Polillo, are in all essential characters typical *Scolopia luzonensis* Warb., and have the peculiar ciliate anthers of that species; yet all three specimens have glands at the apices of their petioles, or on the leaf margins near the insertion of the petioles which would place them in the section *Adenoscolopia*, and as a result necessitate the description of the form as a new species. In my mind there is absolutely no doubt but that all three sheets are fairly typical *Scolopia luzonensis* Warb., a species manifestly belonging in the section *Sphenoscolopia*.

SCOLOPIA SAEVA (Hance) Hance in Ann. Sci. Nat. IV **28** (1862) 217; Briq. in Ann. Conserv. Jard. Bot. Genève **2** (1898) 46.

Phoberos saevus Hance in Walp. Ann. **3** (1853) 825.

Scolopia lanceolata Clos, in Ann. Sci. Nat. IV **8** (1857) 252, p. p., quoad pl. Philip.; Vid. Rev. Pl. Vasc. Filip. (1886) 49.

This species is very similar to *Scolopia luzonensis* Warb., but is distinguished by its entirely glabrous anthers. The following material is apparently referable to it:

LUZON, Benguet Subprovince, *For. Bur. 10921 Curran:* Province of Pangasinan, *For. Bur. 9632 Zschokke:* Province of Zambales, *Merrill 2949, For. Bur. 908 Maule:* Province of Rizal, *For. Bur. 428, 2680 Ahern's collector, Merrill 1653*.

I have seen no specimen of *Cuming 1061*, cited by Clos, but the above specimens agree with Hongkong material and with the descriptions available. *Scolopia lanceolata* Clos is based on *Phoberos lanceolata* W. & A. Prodr. (1834) 30, and is an older name than that proposed by Hance and accepted by Briquet. The type of *Phoberos lanceolata* W. & A. was from India, and the species is, presumably, different from the Philippine form.

[9] Govt. Lab. Publ. (Philip.) 27 (1905) 18.

FLACOURTIA Commerson

FLACOURTIA RUKAM Zoll. & Mor. Syst. Verz. (1854) 33; King, in Journ. As. Soc. Beng. **59** [2] (1890) 117; Vid. Phan. Cuming. Philip. (1885) 94; F.-Vill. Novis. App. (1880) 112.

Hisingera grandifolia Turcz. in Bull. Soc. Nat. Mosc. **27** [2] (1854) 332.

Flacourtia inermis Merr. in Philip. Journ. Sci. 1 (1906) Suppl. 99, non Roxb.

This species is widely distributed in the Philippines, and is somewhat variable in its vegetative characters. In general the leaves of the Philippine form average considerably larger than in our rather comprehensive set of Malayan forms, but there appears to be no specific difference. The species is very similar in vegetative characters to *Flacourtia inermis* Roxb., with which the Philippine specimens have been confused. As indicated in the original description, as later noted by King, and as shown in our Malayan specimens, *Flacourtia inermis* has perfect flowers, while *F. rukam* has diœcious flowers. I refer to *Flacourtia rukam* the following Philippine material:

LUZON, Province of Tayabas, *Cuming 771* (cotype of *Hisingera grandifolia* Turcz.): Benguet Subprovince, *Elmer 8890:* Province of Pangasinan, *For. Bur. 19455 Agama:* Province of Zambales, *For. Bur. 5901, 5999 Curran:* Province of Laguna, *Bur. Sci. 6041 Robinson:* Province of Rizal, *Loher 6772:* Province of Bataan, *For. Bur. 1744 Borden, Whitford 1252.* POLILLO, *Bur. Sci. 9125 Robinson, Bur. Sci. 10410 McGregor.* MINDORO, *For. Bur. 5413 Merritt.* CEBU, *For. Bur. 15253 Cenabre.* DINAGAT, *Ahern 482.* MINDANAO, District of Davao, *Copelend 534.*

CASEARIA Jacquin

CASEARIA PHILIPPINENSIS sp. nov.

Frutex circiter 3 m altus, subtus foliis ramulis floribusque molliter pubescentibus; foliis integris, oblongis ad oblongo-lanceolatis, usque ad 29 cm longis, in siccitate brunneis, acuminatis, basi acutis, breviter petiolatis, nervis utrinque circiter 12; floribus paucis, fasciculatis, sepalis circiter 4.5 mm longis; staminodeis planis, sursum dense villosis.

A shrub about 3 m high, the branchlets, flowers, and lower surface of the leaves rather densely and softly pubescent; branches rather slender, terete, brown. Leaves alternate, entire, oblong to oblong-lanceolate, firmly chartaceous or subcoriaceous, 20 to 29 cm long, 7 to 10 cm wide, brown when dry, the upper surface glabrous, shining, the lower softly brown-pubescent, the apex acuminate, base acute; lateral nerves about 12 on each side of the midrib, somewhat curved-ascending, prominent; petioles stout, 5 mm long or less. Flowers yellowish, axillary, few, subsolitary or somewhat fascicled, shortly pedicelled. Sepals broadly ovate to elliptic-ovate, rounded, pubescent, 4 to 5 mm long. Stamens 10, the free parts of the filaments glabrous, about 1 mm long, slender, the lower 1.5 mm, entirely united with the

staminodes, glabrous; anthers about 1 mm long; staminodes flattened, about 1.4 mm long, the upper part densely villous. Ovary ovoid, about 3 mm long, with very few, scattered, short hairs; style short; stigma capitate.

LUZON, Province of Cagayan, Claveria, *Bur. Sci. 7364 Ramos* (type), March, 1909, in forests. SAMAR, *Phil. Pl. 1644 Ramos*, April, 1914, as *Rinorea*.

A species well characterized by its comparatively large, entire leaves, which are brown when dry, glabrous and shining on the upper surface and softly pubescent on the lower surface; it does not appear to be closely allied to any other Philippine species.

PASSIFLORACEAE

ADENIA Forskål

ADENIA LONGIFOLIA sp. nov.

Scandens, glabra; foliis oblongis, membranaceis, 20 ad 25 cm longis, basi acutis vel leviter acuminatis, biglandulosis, vix auriculatis, apice breviter acute acuminatis, margine distanter repando-denticulatis, nervis utrinque circiter 10; cymis pedunculatis, paucifloris, floribus, ♂ 4-meris, alabastro clavato, circiter 1 cm longo.

A scandent, herbaceous, glabrous vine, or the stems somewhat woody, firm, striate and pale when dry, 3 mm in diameter. Leaves oblong, membranaceous, 20 to 25 cm long, 8 to 10 cm wide, shining, somewhat olivaceous on the upper surface, the lower surface a little paler, base acute or somewhat decurrent-acuminate, 2-glandular, the glands prominent on the lower surface, not auricled, apex shortly and sharply acuminate, margin distantly repand-denticulate; lateral nerves about 10 on each side of the midrib, distinct, anastomosing, the reticulations lax; petioles about 4 cm long. Peduncles solitary, axillary, up to 6 cm long, the cymes few-flowered. Staminate flowers greenish or nearly white, the fully mature buds clavate, about 1 cm long, the lobes 4, ovate, short. Stamens 4, narrowly oblong, about 3.5 mm long. Pistillate flowers and fruits not seen.

BASILAN, *Bur. Sci. 15495 Reillo*, August, 1912.

A species well characterized by its oblong, thin, repand-denticulate leaves, which are acute or decurrent-acuminate at the base but not auriculate.

ADENIA PALMATIFOLIA sp. nov.

Scandens, glabra; foliis profunde palmato-5-lobatis, basi prominente subauriculato-glandulosis, lobis lanceolatis, rectis vel leviter falcatis, acuminatis, integris, usque ad 20 cm longis, 1.5 ad 2.5 cm latis; pedunculo elongato; fructibus (immaturis) circiter 6 cm longis, nitidis, ut videtur obovoideis.

A scandent, glabrous, herbaceous vine, the branches pale, striate, terete, 2 to 3 mm thick. Leaves chartaceous or subcoriaceous, pale when dry, slightly shining and of the same color on both surfaces, the base very broadly truncate or abruptly acute, subauriculate-glandular, 3- or obscurely 5-plinerved, the lamina up to 23 cm long, subreniform in outline, very deeply palmately 5-lobed, the lobes lanceolate, straight or somewhat falcate, entire, sharply acuminate, 8 to 20 cm long, 1.5 to 2.5 cm wide, the sinuses obtuse or acute, each with a prominent gland on the lower surface of the leaf, each lobe with a prominent midrib, the nerves slender, distinct, spreading at right angles, anastomosing; petioles 2.5 to 4 cm long. Peduncles up to 15 cm long, the tendril part short. Flowers not seen. Immature fruits apparently obovoid, about 6 cm long, shining, yellowish-brown when dry, the pericarp thin, brittle.

LUZON, Subprovince of Benguet, Sablan, *Elmer 6262,* April, 1904 (type), *Bur. Sci. 12577 Fénix,* December, 1910, in forests and thickets.

The specimens, or at least those of the last number cited, were distributed as *Modecca parviflora* Blanco, but that species is described as having 3-lobed leaves, while the present form has constantly 5-lobed leaves. It is suspected that *Modecca triloba* Blanco and *M. parviflora* Blanco are the same species, and moreover that they are only forms of *Adenia coccinea* (Blanco) Merr. (*Modecca coccinea* Blanco). There are several specimens in the herbarium of the Bureau of Science that present entire ovate leaves on the same branches with prominently 3-lobed ones. *Modecca saponaria* Blanco is a species of *Momordica,* and does not belong to the *Passifloraceae. Adenia palmatifolia* is well characterized by its deeply palmately 5-lobed leaves and its narrow, straight or falcate lobes.

ADENIA CRASSA sp. nov.

Scandens, glabra; foliis integris, ovatis, circiter 10 cm longis, basi late rotundatis, cordatis, auriculatis, apice acute acuminatis, chartaceis vel submembranaceis; fructibus ellipsoideis vel ovoideis, circiter 8 cm longis, pericarpio crassissimo; seminibus inaequilateraliter obovatis, compressis, foveolatis, 8 mm longis.

A scandent, glabrous, apparently herbaceous vine, the stems slender, pale, striate, terete. Leaves ovate, chartaceous or submembranaceous, 8 to 10 cm long, 5 to 7 cm wide, entire, base broadly rounded, prominently cordate, and biauriculate, the apex rather slenderly and sharply acuminate, both surfaces somewhat shining, the lower a little paler then the upper; base 5-nerved or somewhat 5-plinerved, the lateral nerves above the base one or two pairs, distinct, reticulations lax; petioles 1.5 to 2.5 cm long; peduncles axillary, solitary, slender, about 3 cm long, the cymes apparently few-flowered, the tendril-parts short. Flowers unknown. Fruit when fully mature about 8 cm long,

ellipsoid or ovoid, smooth, pale, shining, splitting into 3 valves, the pericarp very firm, about 2 mm thick; seeds numerous, compressed, inequilateral, about 8 mm long, pale, prominently pitted, base acute, apex somewhat oblique, their funicles up to 2 cm in length.

BASILAN, *Bur. Sci. 15419 Reillo*, August, 1912.

In vegetative characters somewhat similar to our common *Adenia coccinea* (Blanco) Merr., but in this species the pericarp of the mature fruit is very thin, almost membranaceous.

THYMELAEACEAE

WIKSTROEMIA Endlicher

WIKSTROEMIA POLYANTHA sp. nov.

Frutex vel arbor parva, ramulis puberulis vel leviter pubescentibus; foliis brevissime petiolatis, ovatis ad oblongo-ovatis, coriaceis, nitidis, usque ad 6 cm longis, acutis vel obscure acuminatis, basi late rotundatis vel obscure cordatis, nervis utrinque circiter 8, tenuibus; inflorescentiis racemosis, floribus numerosis, brevissime pedicellatis, circiter 1 cm longis, extus glabris vel parcissime pubescentibus.

A shrub or small tree, nearly glabrous, the branches terete, reddish-brown, glabrous, the branchlets obscurely puberulent, the younger ones with very short, appressed, cinereous hairs, somewhat angled or compressed. Leaves ovate to oblong-ovate, glabrous, brownish when dry, shining on both surfaces, the lower surface a little paler than the upper, the apex acute or very obscurely acuminate, the base broadly rounded, often obscurely cordate; nerves slender, about 8 on each side of the midrib, obscurely anastomosing; petioles reddish-brown, obscurely puberulent, 2 mm long or less. Racemes terminal or in the uppermost axils, appressed-hirsute, 2 to 3 cm long, many-flowered, the entire lower part thickly covered with the persistent pedicels of fallen flowers, the buds and open flowers crowded at the apices, the pedicels sparingly appressed-hirsute, stout, less than 1 mm long. Perianth cylindric, yellow, 10 to 11 mm long, about 1.5 mm in diameter, glabrous outside, or with very few scattered hairs in the upper part, the two outer lobes orbicular-elliptic, broadly rounded, 2.2 mm long, the two inner ones somewhat shorter and narrower. Stamens 8, 4 inserted at about the middle of the tube, 4 inserted near the apex, included; anthers narrowly oblong, 1.5 mm long. Ovary narrowly oblong, cylindric, 2.5 mm long, villous at the apex, glabrous below; style slender, about 1 mm long; stigma globose, 0.5 mm in diameter.

Fruit narrowly ovoid, fleshy, red, about 8 mm long, sparingly villous near the apex, otherwise entirely glabrous.

LUZON, Province of Rizal, near the summit of Mount Susung Dalaga, *Bur. Sci. 19243 Reillo*, December 9, 1913.

A very characteristic species, quite distinct from the other Philippine forms in its many-flowered, somewhat elongated racemes, the rachises of which are rather densely covered with the short, persistent, stout pedicels.

RHIZOPHORACEAE

GYNOTROCHES Blume

GYNOTROCHES PUBERULA sp. nov.

Arbor parva, ramulis junioribus, subtus foliis stipulisque plus minusve puberulis vel breviter pubescentibus; foliis oblongis, subcoriaceis, integris, acuminatis, basi acutis, usque ad 15 cm longis, nervis utrinque circiter 7, curvato-adscendentibus; fructibus axillaribus, fasciculatis, pedicellatis, ovoideis, circiter 4 mm longis.

A species very similar to *Gynotroches axillaris* Blume, differing chiefly in its indumentum. Branches slender, terete, brownish-red, somewhat compressed at the nodes, glabrous, the young branchlets puberulent. Leaves subcoriaceous, oblong, 10 to 15 cm long, 3 to 6 cm wide, pale or brownish when dry, shining, the base acute, the apex rather prominently acuminate, the upper surface quite glabrous, the lower distinctly puberulent or short-pubescent especially on the midrib and lateral nerves; lateral nerves about 7 on each side of the midrib, rather prominent, curved-ascending; petioles about 8 mm long, puberulent; stipules linear-lanceolate, 1.2 cm long, puberulent, deciduous. Fruits numerous, axillary, fascicled, red when mature, ovoid, about 4 mm long, the pedicels jointed at about the middle, about as long as the fruits, the persistent sepals ovate, acute, 1.5 mm long.

SAMAR, Catbalogan, *Bur. Sci. 17396 Ramos* (type); Cauayan Valley, *Phil. Pl. 1632 Ramos*, April, 1914, in forests.

Very similar to and manifestly closely allied to *Gynotroches axillaris* Blume, from which it differs chiefly in its puberulent indumentum on the young branchlets, petioles, stipules, and lower surface of its leaves.

ARALIACEAE

BOERLAGIODENDRON Harms

BOERLAGIODENDRON DIVERSIFOLIUM sp. nov.

Frutex 2 ad 3 m altus, inflorescentiis exceptis glaber; foliis coriaceis, valde diversis, majoribus usque ad 35 cm longis, usque ad $\frac{1}{2}$ vel $\frac{2}{3}$ palmatim 3- vel 5-lobatis, superioribus minoribus, ellipticis ad oblongo-ovatis, 15 ad 30 cm longis, margine grosse

irregulariter serratis; inflorescentiis terminalibus, plus minusve ferrugineo-furfuraceo-villosis vel hirsutis; floribus numerosis, 5-meris.

A shrub 2 to 3 m high, glabrous except the inflorescence, the branches terete, gray, 1 to 1.5 cm in diameter. Leaves crowded at the apices of the branches or of the simple (?) stem, coriaceous, exceedingly variable in form; larger leaves palmately 3- or 5-lobed, up to 35 cm long, the lobes reaching to the middle or lower two-thirds of the leaf, 5 to 11 cm wide, acuminate, coarsely and irregularly serrate, the sinuses rounded; other leaves on the same branchlets not at all lobed, elliptic to oblong-ovate, acuminate, coarsely and irregularly serrate, 15 to 30 cm long, 7 to 17 cm wide, the nerves prominent, more or less ascending; petioles 5 to 25 cm long, base with several crestlike ridges. Inflorescence terminal, crowded, furfuraceous-villous or hirsute with few to many short, brown hairs, the primary branches numerous, 2 to 3 cm long, each subtended by lanceolate, furfuraceous, and somewhat pectinate-ciliate bracts 2 to 2.5 cm long; central sterile head 1 to 2 cm in diameter, sessile or very shortly peduncled, the sterile fruits globose, fleshy, glabrous, purple when fresh, black when dry, 3 to 5 mm in diameter, the pedicels about as long as the fruits; each primary branch with two lateral branches bearing globose heads of perfect flowers, these lateral branches 2 to 3 cm long, the heads globose, dense, about 1.5 cm in diameter. Flowers many, densely disposed, 5-merous, yellowish, their pedicels stout, somewhat pubescent, 2 mm long. Calyx 2 mm long and wide, glabrous, truncate. Corolla 3.5 to 4 mm long, with 5, ovate, acute or obtuse, 1 to 1.2 mm long teeth; filaments 4 to 5 mm long; anthers about 1.7 mm long. Ovary 5-celled. Bracteoles numerous, brown-hirsute, broadly ovate, obtuse, 2 to 2.5 mm long. Entire inflorescence up to 15 cm in diameter.

MINDANAO, Bukidnon Subprovince, Sumilao, *Bur. Sci. 15727 Fénix* (type), August 2, 1913, steep slopes near streams; Mount Dilirig, *Bur. Sci. 21447 Escritor*, July 30, 1913: Butuan Subprovince, *Weber 1099*, July 14, 1911, at Talacogon, distributed as *B. serratifolium* Elm.

A species characterized by its exceedingly variable leaves, these small to large, and entire to deeply 5-lobed. The variation somewhat parallels that of *Boerlagiodendron heterophyllum* Merr., but the species are very different from each other.

MYRSINACEAE

ARDISIA Swartz

ARDISIA ZAMBALENSIS nom. nov.

Ardisia biflora Merr. in Philip. Journ. Sci. 5 (1910) Bot. 212, non King & Gamble, 1905.

The above new name is necessary for this species as the one previously selected was preoccupied.

ARDISIA KEITHLEYI nom. nov.

Ardisia oblongifolia Merr. in Philip. Journ. Sci. 5 (1910) Bot. 219, non King & Gamble, 1905.

Dedicated to Lieutenant Keithley in whose honor Camp Keithley was named. The new name is necessary as the original specific name was preoccupied.

EBENACEAE

DIOSPYROS Linnaeus

DIOSPYROS ALVAREZII sp. nov.

Arbor circiter 15 m alta, glabra vel subglabra, ramulis tenuibus, leviter puberulis vel subglabris; foliis chartaceis, oblongo-ellipticis ad oblongis, usque ad 16 cm longis, utrinque subaequaliter angustatis, basi acutis, eglandulosis, apice acutis vel obscure acuminatis, nitidis, pallidis, nervis utrinque 5 vel 6, tenuibus, prominentibus, reticulis laxis; floribus axillaribus, ut videtur solitariis vel binis, pedicellatis 4-meris; fructibus depresso-globosis, junioribus 1.3 cm diametro, pubescentibus, 8-locellatis, calycibus persistentibus, coriaceis, tubo circiter 1.5 cm diametro, lobis late ovatis, 1.5 cm longis, reflexis.

A tree about 15 m high, nearly glabrous except the fruits (flowers unknown). Branches terete, very slender, the branchlets sometimes minutely puberulent. Leaves chartaceous, pale when dry, oblong-elliptic to oblong, 10 to 16 cm long, 4 to 7 cm wide, shining, subequally narrowed to the acute, eglandular base and to the acute or somewhat acuminate apex; lateral nerves 5 or 6 on each side of the midrib, distinct, slender, rather prominent, anastomosing, the reticulations lax; petioles 6 to 8 mm long. Flowers 4-merous, axillary, apparently solitary or in pairs, the pedicels, in fruit, minutely puberulent, 1.5 cm long or less. Young fruits depressed-globose, about 1.3 cm in diameter, grayish-pubescent with short, appressed hairs, apiculate; persistent calyx large and prominent, thickly chartaceous, externally more or less puberulent, the tube very shallow, up to 1.5 cm in diameter, 4-angled, the angles rather sharp, the lobes sharply reflexed, broadly ovate, obtuse, up to 1.5 cm long, more or less plicate when dry; fruit 8-celled.

LUZON, Province of Camarines, Lanot, *For. Bur. 21417 Alvarez,* May 12, 1914, forested slopes at about sea level, locally known as *bantolinao.*

A species well characterized by its chartaceous, distantly but rather prominently nerved leaves, and especially by its prominent, accrescent, persistent, reflexed calyx which in young fruit is sharply 4-angled.

DIOSPYROS PONCEI sp. nov.

Arbor circiter 9 m alta, ramulis junioribus dense adpresse subferrugineo-hirsutis, foliis junioribus subtus obscure adpresse pubescentibus, fructibus subglobosis, extus densissime ferrugineo-hirsutis, junioribus circiter 2 cm diametro; foliis oblongis ad oblongo-lanceolatis, coriaceis, usque ad 9 cm longis, in siccitate pallidis, nitidis, utrinque subaequaliter angustatis, basi acutis, apice acutis vel breviter acuminatis, nervis lateralibus obscuris; sepalis persistentibus, orbiculari-ovatis, circiter 6 mm diametro, adpresse hirsutis.

A tree about 9 m high, the branches terete, glabrous, wrinkled, dark gray, the younger ones reddish-brown, smooth, the growing parts densely appressed ferruginous-hirsute. Leaves coriaceous, oblong to oblong-lanceolate, 6 to 9 cm long, 1.4 to 2.8 cm wide, subequally narrowed to the acute base and to the acute or somewhat acuminate apex, eglandular, the upper surface pale olivaceous when dry, shining, glabrous, or the midrib in the lower part somewhat appressed-pubescent with pale, shining hairs, the lower surface paler than the upper, when young sparingly appressed-pubescent with pale hairs, when mature quite glabrous; lateral nerves slender, obscure, ascending, the primary ones about 12 on each side of the midrib, scarcely more distinct than are the secondary ones and the reticulations; petioles 5 mm long or less, appressed-hirsute when young, becoming glabrous in age. Flowers not seen. Fruits globose, the young ones about 2 cm in diameter, axillary, sessile or subsessile, solitary, the pericarp very densely hirsute with ferruginous or fulvous hairs. Sepals persistent, plane, coriaceous, orbicular-ovate, about 6 mm in diameter, rounded, outside rather densely appressed-hirsute with pale or ferruginous hairs.

MINDANAO, Province of Surigao, Combot, *For. Bur. 22842 Ponce*, August 28, 1914, on semiopen slopes, altitude about 15 meters, locally known as *ituman*.

A species in many characters resembling the common *Diospyros discolor* Willd., and probably belonging in the same section as Willdenow's species. It differs remarkably, however, in its very much smaller, entirely differently shaped leaves which are quite glabrous on both surfaces when mature.

DIOSPYROS CAMARINENSIS sp. nov.

Arbor circiter 25 m alta, floribus exceptis glabra; foliis chartaceis, oblongis, usque ad 27 cm longis, breviter acuminatis, basi acutis vel subacutis, in siccitate nitidis, nigricantibus, nervis utrinque 12 ad 14, subtus distinctis, reticulis laxis; floribus axillaribus, fasciculatis, 4-meris, extus pubescentibus, calycis lobis erectis, acuminatis, corolla inflata; ovario 8-loculare; fructibus

globosis vel depresso-globosis, circiter 3 cm diametro, in siccitate nigris, nitidis, glabris, seminibus 7 vel 8.

A tree about 25 m in height, quite glabrous except the flowers, the branches slender, terete, dark-colored, the branchlets and petioles black when dry. Leaves chartaceous, dark-colored or somewhat blackish when dry, shining, 14 to 27 cm long, 5 to 9 cm wide, of about the same color on both surfaces, the apex shortly acuminate, base acute to subacute, usually with a pair of distinct glands near the junction with the petiole; lateral nerves 12 to 14 on each side of the midrib, slender, distinct, anastomosing, the reticulations rather lax, distinct; petioles 1 to 1.5 cm long. Flowers axillary, fascicled, 4-merous, few in each fascicle, some in the axils of leaves, some in the axils of fallen leaves, each subtended by one or two pairs of broadly ovate, pubescent bracts 2 mm long or less. Calyx about 8 mm long and 7 mm in diameter, pubescent externally, black when dry, the lobes broadly ovate, acuminate, erect, about 4 mm long, 4 to 4.5 mm wide at the base. Corolla-tube 8 to 9 mm long, inflated, about 7 mm in diameter, much narrowed toward the throat, rather densely pubescent with short, grayish-brown hairs, the lobes 4, spreading, narrowly oblong, somewhat falcate, acute, thickly coriaceous, about 9 mm long, 5 mm wide. Stamens about 20, mostly in pairs, 2-seriate, the filaments of each pair more or less united; anthers narrowly lanceolate, acuminate, 3.5 to 5.5 mm long. Ovary ovoid, pubescent, about 4 mm in diameter, 8-celled; style stout, pubescent, widened below, about as long as the ovary, the stigma irregularly lacerate. Fruit globose or depressed-globose, yellow to red when mature, black and shining when dry, about 3 cm in diameter, the persistent calyx black, coriaceous, glabrous or nearly so, nearly square in outline, about 1.5 cm broad, shallow. Seeds 7 or 9, somewhat flattened, about 13 cm long, 7 mm wide, rounded at both ends, smooth, black, shining, the albumen smooth.

LUZON, Province of Camarines, *For. Bur. 21443* (type) *21705, 22631 Alvarez*, April and May, 1914, March, 1912, from Mount Calinigan, Mount Labo, and Lanot River, in forests, 100 to 500 meters.

The species is perhaps as closely allied to *Diospyros maritima* Blume as any other species, but with entirely different, much thinner, fewer nerves and different flowers and fruits.

MIMUSOPS Linnaeus

MIMUSOPS CALOPHYLLOIDES sp. nov.

Arbor circiter 18 m alta, floribus exceptis glaberrima; foliis oblongo-obovatis, subcoriaceis, usque ad 12 cm longis, obtusis ad rotundatis, basi acutis, nitidis, nervis lateralibus numerosissimis, densis, distinctis, margine recurvatis, venis marginalibus dis-

tinctis; floribus 6-meris, sepalis puberulis circiter 5 mm longis, exterioribus quam interioribus bis latioribus; staminibus 6; ovario glabro, 6-loculare; fructibus globosis, 2 ad 2.5 cm diametro, breviter apiculatis, glabris, pericarpio fragile.

A tree about 18 m high, entirely glabrous except the flowers. Branches dark-colored when dry, the younger ones marked with numerous, crowded, petiolar scars. Leaves subcoriaceous, oblong-obovate, 9 to 12 cm long, 2.5 to 5 cm wide, entirely glabrous on both surfaces, shining, subolivaceous when dry, the base acute, the apex obtuse to rounded, margins distinctly recurved; lateral nerves very numerous, slender but rather distinct, the primary ones not more prominent than the secondary ones and the reticulations, crowded, about 20 to a centimeter, uniting to form a distinct submarginal nerve about 1 mm from the edge of the leaf; petioles 2 to 2.5 cm long. Flowers axillary, 6-merous, their pedicels puberulent, in fruit thickened upward and about 2.5 cm long. Sepals 6, 2-seriate, puberulent, the outer three about 5 mm long, triangular-oblong, acute, the inner three as long as the outer ones but one-half as wide. Stamens 6. Ovary glabrous, 6-celled. Fruit globose, 2 to 2.5 cm in diameter, brown when dry, tipped by the very short style, glabrous, the pericarp brittle. Seeds 1 or 2 in each fruit, brown and shining, obtuse, about 1.5 cm long and 1 cm wide, slightly compressed.

MINDANAO, Province of Surigao, Cadyangao, *For. Bur. 22834 Ponce*, August 20, 1914, in rather dense forests at about sea level, locally known as *duyuk-duyuk*.

The alliance of this species is with the Malayan *Mimusops kauki* Linn. from which it differs in its leaves being entirely glabrous, even when very young, not at all pubescent on the lower surface, its much more distinct lateral nerves, giving the leaves quite the appearance of those of some species of *Calophyllum*, and the distinct marginal veins.

OLEACEAE

LINOCIERA Swartz

LINOCIERA OBOVATA sp. nov.

Arbor parva, ramulis junioribus inflorescentiisque minute puberulis exceptis glabra; foliis crassissime coriaceis, obovatis, 4 ad 7 cm longis, apice late rotundatis vel late breviter acuminatis, basi angustatis, decurrento-acuminatis, nervis lateralibus obscuris, circiter 8 utrinque. Cymis axillaribus, solitariis, anguste pyramidatis, dense multifloris, sessilibus.

A small tree, glabrous except the minutely puberulent branchlets and the inflorescence. Branches gray, stout, terete, glabrous. Leaves very thickly coriaceous, obovate, 4 to 7 cm long, 2 to 4.5 cm wide, pale when dry, the upper surface shining, the

lower dull, apex broadly rounded, sometimes very shortly and broadly acuminate, sometimes even slightly retuse, the base narrowed and more or less decurrent on the petioles, the margins recurved; lateral nerves indistinct, often subobsolete, about 8 on each side of the midrib; petioles 1 to 1.5 cm long. Cymes paniced, axillary, sessile, solitary, densely many-flowered, branched from the base, slightly puberulent, brown when dry, 2 to 4.5 cm long, 2 to 3 cm wide, the branches spreading. Flowers 4-merous, the buds ellipsoid or obovoid, about 2 mm long, their pedicels 1 to 3 mm long. Calyx-teeth broadly triangular, acute, short. Mature flowers and fruits not seen.

LUZON, Province of Laguna, San Antonio, in forests, *Bur. Sci. 15014 Ramos* (type), *Phil. Pl. 1161 Ramos*, June, 1912.

A very characteristic species, recognizable by its very thick, obovate, obscurely nerved leaves, and by its dense pyramidal inflorescence.

LINOCIERA NITIDA sp. nov.

Ut videtur arbor parva, glabra; foliis oblongis, in siccitate nitidis, subcoriaceis, oblongis vel late oblongis, usque ad 18 cm longis, basi rotundatis vel subacutis, apice brevissime acuminatis, nervis utrinque circiter 8, patulis, prominentibus, anastomosantibus, reticulis obsoletis vel subobsoletis; racemis brevibus, 1 ad 1.5 cm longis, solitariis vel fasciculatis, axillaribus, densifloris; floribus 4-meris, 5 mm longis.

Apparently a small tree, glabrous, the branches terete, smooth, light gray. Leaves oblong or broadly oblong, subcoriaceous, 12 to 18 cm long, 5 to 7 cm wide, entire, brown when dry, or the upper surface somewhat olivaceous and the lower surface brown, shining on both surfaces, smooth, the base broadly rounded or somewhat acute, the apex very shortly and somewhat abruptly acuminate; lateral nerves 7 or 8 on each side of the midrib, prominent, spreading at nearly right angles, somewhat curved, anastomosing, the reticulations obsolete or nearly so; petioles dark brown, 2 to 3 mm long. Racemes short, axillary or in the axils of fallen leaves, solitary or somewhat fascicled, 1 to 1.5 cm long, densely flowered, quite glabrous or very obscurely and sparsely puberulent, the bracts broadly ovate, acute or acuminate, 1.5 mm long. Sepals ovate, acute, about 1 mm long. Petals 4, narrowly oblong, thick, 5 mm long, about 1 mm wide, slightly narrowed upward, the apex obtuse, somewhat cucullate, the margins somewhat inflexed. Anthers about 1 mm long, the connective very broad.

BASILAN, *Bur. Sci. 15406 Reillo*, August 11, 1912, in forests.

A species well characterized by its vegetative characters, especially by its leaves being brown when dry and with obsolete or nearly obsolete

reticulations, and its short, many-flowered, mostly fascicled, racemose inflorescence.

LINOCIERA PALUDOSA King & Gamble in Journ. As. Soc. Beng. 74 [2] (1905) 268.

PALAWAN, Taytay, *Merrill 9177, 9335, Phil. Pl. 1373* (as *L. euphlebia* Merr.), April, May, 1913.

The specimens are not quite identical with *King's collector 6476* from Larut, Malay Peninsula, a duplicate of one of the specimens cited in the original description. I can, however, detect no essential differences and prefer to consider the Philippine form under King & Gamble's specific name.

Previously known only from the Malay Peninsula.

BORAGINACEAE

HELIOTROPIUM Linnaeus

HELIOTROPIUM OVALIFOLIUM Forsk. var. **DEPRESSUM** (Cham.) Merr. in Philip. Journ. Sci. 9 (1914) Bot. 134.

Heliotropium gracile R. Br. var. *depressum* Cham. in Linnaea (1829) 457.

Heliotropium coromandelinum Retz. var. *depressum* A. DC. Prodr. 9 (1845) 542.

LUZON, Province of Laguna, Calamba, along the shores of Lake Bay, *F. C. Gates 6651*, July 27, 1913.

This species, other than the record of F.-Villar, sub *H. coromandelinum* Retz., is new to the Philippines. The specimen cited above agrees in all essentials with our Guam material, the type of the variety *depressum* being from Guam. It differs from the Indian material notably in its relatively longer and much narrower leaves. Forskål's specific name dates from the year 1775, Retzius's name from the year 1781.

India, Tropical Africa, and Australia, the variety in Luzon and the Mariana Islands (Guam).

GESNERIACEAE

TRICHOSPORUM D. Don

TRICHOSPORUM BAKERI sp. nov. § *Holocalyx.*

Scandens, ramulis junioribus plus minusve pilosus; foliis coriaceis, in siccitate pallidis, ovatis ad elliptico-ovatis, usque ad 4.5 cm longis, obtusis vel late obscure obtuseque acuminatis, basi rotundatis, nervis lateralibus circiter 3, obscurissimis vel obsoletis; floribus glaberrimis, 5.5 cm longis, corolla quam calycis duplo longioribus.

Scandent, slender, elongated, the stems terete, grayish, wrinkled, 3 mm in diameter or less, rooting at the nodes, sparingly branched, the younger branchlets rather densely villous. Leaves numerous, when fresh apparently fleshy, when dry coriaceous or subcoriaceous, pale, dull or slightly shining, the

nerves and reticulations obsolete, or sometimes about 3 pairs of lateral nerves evident but obscure, 2 to 4.5 cm long, 1.5 to 3.8 cm wide, base rounded to obscurely cordate, apex obtuse to broadly and obscurely blunt-acuminate, the younger ones often slightly villous on the margins; petioles 2 to 4 mm long, when young more or less villous, when old quite glabrous. Flowers apparently dark red, on short, 1- or 2-flowered peduncles in the uppermost axils. Calyx cylindric, quite glabrous, about 2.5 cm long, very shallowly lobed, slightly enlarged upward. Corolla about 5.5 cm long, entirely glabrous, somewhat curved, contracted above the base, then expanded, the lobes broad, subequal; stamens slightly exserted; style pubescent in the lower one-half.

LUZON, Province of Laguna, hills back of Paete, *C. F. Baker 3714* (type), *3719*, December 28, 1914; Mount Maquiling, *Bur. Sci. 16889 Serviñas*, November, 1912, trailing over bowlders or ledgers.

A species similar to and manifestly closely allied to **TRICHOSPORUM LOHERI** (Kränzl.) [*Aeschynanthus loheri* Kränzl. in Philip. Journ. Sci. 8 (1913) Bot. 165], from which it differs in its much slenderer, entirely glabrous flowers. Kränzlin describes the flowers of *Trichosporum loheri* as glabrous, but both the calyx and corolla are distinctly but minutely pubescent externally.

ACANTHACEAE

ASYSTASIA Blume

ASYSTASIA GANGETICA (Linn.) T. And. in Thwaites Enum. Pl. Zeyl. (1859–64) 235.

Justicia gangetica Linn. Amoen. Acad. 4 (1759) 299.
Asystasia coromandelica Nees in Wall. Pl. As. Rar. 3 (1832) 89, F.-Vill. Nov. App. (1880) 154.

LUZON, Province of Isabela, Ilagan, *Bur. Sci. 7981 Ramos:* Province of Laguna, Los Baños, *Merrill 8613, For. Bur. 20858 Villamil, Bur. Sci. 17282 Robinson & Foxworthy*, all from living plants secured in Cagayan Province by Mr. Curran.

The above is the first verification of F.-Villar's record for this genus and species as a Philippine plant. Widely distributed in tropical Asia, Africa, and Malaya.

POLYTREMA C. B. Clarke

POLYTREMA ADDISONIENSE (Elmer) comb. nov.

Hypoestes addisoniensis Elmer Leafl. Philip. Bot. 5 (1913) 1697.

The type number of this is *Elmer 12715*, from Addison Peak, Palawan; the same species is apparently represented by *Merrill 7235* from Ulugan Bay, Palawan, September, 1910. It is not a *Hypoestes* but is congeneric with the three species of the Malay Peninsula for which C. B. Clarke has proposed the generic name *Polytrema*. The Palawan species is apparently closely allied to *Polytrema vulgare* C. B. Clarke. The genus appears to be very closely allied to *Hallieracantha* Stapf. Here I also refer the following species:

POLYTREMA PULGARENSE (Elmer) comb. nov.

Hypoestes pulgarensis Elmer Leafl. Philip. Bot. 5 (1913) 1698.

The type is *Elmer 12785*, from Mount Pulgar, Palawan, and is not matched by any other collection so far received.

POLYTREMA AEQUIFOLIUM C. B. Clarke sp. nov.

Procumbens, radicans, parum pilosa, foliis oppositis, aequalibus, lamina 6 ad 7 cm longa, elliptica aut lanceolata, petiolo 5 ad 10 mm longo; corolla 11 ad 12 mm longa; capsula 15 mm longa, glabra; seminibus 4, minute verrucosis.

Resembling a weak axillary-flowered *Justicia*, the corolla and capsule much as in that genus. Stamens 2; anther-cells parallel, oblong, at equal height, muticous. Pollen globose, minutely granular, without bands, with 4 (or more) stopples. Cymes 5- to 1-flowered, small, axillary. Calyx-segments 5, linear, 6 mm long; bract lanceolate, shorter than the calyx.

PALAWAN, Puerto Princesa, *Bur. Sci. 357 Bermejos*, January, 1906.

The above description was supplied to me by the late C. B. Clarke some time before his death, but was not printed then as the description of the genus had not been published at that time.

LEPIDAGATHIS Willdenow

LEPIDAGATHIS PALAWANENSIS sp. nov.

Herba erecta usque ad 60 cm alta, haud vel parce ramosa, subtus foliis ad nervis ramulisque prominente subfurfuraceo-pubescentibus, inflorescentiis dense albido-ciliato-pilosis; foliis chartaceis, oblongo-ovatis, usque ad 12 cm longis, integris vel obscure undulatis, obtusis vel subacutis, base longe decurrento-acuminatis, nervis utrinque 8 vel 9, subtus prominentibus; spicis axillaribus terminalibusque, fasciculatis, densis, usque ad 5 cm longis, calycis lobis bracteisque dense ciliato-pilosis; capsulis 5 mm longis, 4-angulatis.

An erect, unbranched or sparingly branched herb up to 60 cm in height, the stems terete, about 4 mm in diameter, the younger parts obscurely 4-angled, rather prominently subfurfuraceous-pubescent as are the nerves on the lower surface of the leaves and petioles. Leaves in equal pairs, oblong-ovate, chartaceous, 9 to 12 cm long, 3.5 to 6 cm wide, the upper surface olivaceous, shining, glabrous, with scattered, short cystoliths, the lower surface a little paler, apex obtuse or subacute, base long-decurrent-acuminate, winging the petiole nearly to its base, the petioles 3 to 4 cm long; lateral nerves 8 or 9 on each side of the midrib, prominent on the lower surface. Spikes axillary and terminal,

numerous, fascicled, up to 5 cm in length, dense, many-flowered, ciliate-pilose with white hairs. Bracts oblong-lanceolate, acuminate, about 4.5 mm long, 1.5 mm wide, imbricate, prominently ciliate-pilose with white hairs as are the sepals. Sepals 5, four narrowly lanceolate, acuminate, 4 mm long, 0.8 mm wide, the other as long but twice as wide. Corolla at least 5 mm long, the lobes subequal, rounded. Capsule oblong-lanceolate, narrowed upward, 4-angled, about 5 mm long, slightly puberulent toward the apex; seeds 4.1 mm in diameter, the margins rather prominently ciliate.

PALAWAN, Taytay, *Merrill 9760,* April, 1913, in dry thickets along trails at sea level.

Perhaps as closely allied to *Lepidagathis mindorensis* Merr. as any other species, but the indumentum not at all capitate-glandular and the leaves entirely different in shape, not rounded or cordate at the base and with short petioles, but long decurrent-acuminate and long-petioled.

LEPIDAGATHIS MINDORENSIS sp. nov.

Herba erecta circiter 20 cm alta; foliis oblongo-lanceolatis, subcoriaceis, glabris, usque ad 9 cm longis, basi late rotundatis vel subcordatis, supra sensim angustatis, obtusis vel obscure obtuse acuminatis, breviter petiolatis; spicis terminalibus dense fasciculatis, 2 ad 4 cm longis, angustis, densis, calycis segmentis bracteisque capitato-glandulosis, plus minusve dense ciliato-pilosis; capsulis dense cinereo-pubescentibus.

An erect herb about 20 cm high, somewhat branched, the basal parts of the stems somewhat woody, terete, glabrous, grayish-brown, the younger parts distinctly 4-angled, brown, more or less densely covered with weak, crisp, brownish hairs. Leaves in equal pairs, oblong-lanceolate, subcoriaceous, 5 to 9 cm long, 2 to 3 cm wide, widest in the lower part, gradually narrowed upward to the blunt, or slightly blunt-acuminate apex, the base broad, rounded or subcordate, margins slightly undulate, the upper surface glabrous and shining, the lower when young somewhat puberulent on the midrib and nerves; nerves slender, distinct beneath, anastomosing and forming a submarginal nerve; petioles pubescent, 2 to 4 mm long. Spikes terminal, fasciculate, many at the apex of each branch, crowded, 2 to 5 cm long, less than 5 mm in diameter, the bracts and calyx-segments rather densely ciliate-pilose, with numerous glandular-capitate hairs intermixed. Bracts narrowly lanceolate, slenderly long-acuminate, about 4 mm long, less than 1 mm wide, 1-nerved. Calyx-segments all 1-nerved, slenderly acuminate, narrowly lanceolate, one

about 1.2 mm wide, two slightly less than 1 mm wide, the fourth cleft to within about 1 mm of the base. Corolla pink, pubescent outside, 5 mm long, the tube slightly narrowed upward, not abruptly contracted, the upper lip about 1.3 mm wide, rounded or very obscurely retuse, the lower one cleft into three obtuse lobes about 1.2 mm long and 1 mm wide. Anthers 0.5 mm long, the cells parallel. Capsule narrowly oblong-ovate, densely cinereous-pubescent with short hairs.

MINDORO, Bulalacao, in rocky soils along streams, altitude about 50 meters, *Bur. Sci. 6702 Robinson*, March 17, 1909.

A species well characterized by its firm, short-petioled leaves which are rounded or subcordate at the base, and by its narrow, dense, fasciculate spikes, the bracts, bracteoles, and calyx-segments being rather densely ciliate-pilose and capitate-glandular, and in its capsules being densely cinereous-pubescent.

LEPIDAGATHIS CLARKEI sp. nov.

Species *L. incurvae* Don affinis differt spicis oblongis, solitariis vel subsolitariis, bracteis majoribus, margine parce ciliatis exceptis glabris, in siccitate brunneis vel brunneo-purpureis.

An erect herbaceous plant 20 to 30 cm high, not or but slightly branched, the basal part rarely decumbent. Stems brown or olivaceous, glabrous, slender, terete or slightly angled. Leaves in equal pairs, ovate to oblong-ovate, membranaceous, greenish when dry, slightly shining and somewhat paler on the lower surface than on the upper, 5 to 10 cm long, 2.5 to 4.5 cm wide, the base usually long and slenderly decurrent-acuminate, the apex acute or obscurely acuminate, margins entire, both surfaces with scattered, short cystoliths, glabrous; lateral nerves about 6 on each side of the midrib, slender; petioles 1 to 2.5 cm long. Spikes solitary, terminating the stem and the short, axillary branches, the whole inflorescence appearing compound, the individual spikes oblong, 2 to 5 cm long, about 1.5 cm in diameter, the bracts lanceolate, long and slenderly acuminate, about 11 mm long, 2 mm wide, brown or brown-purple when dry, 3-nerved, with distinct transverse reticulations in the upper part, glabrous except the slightly ciliate margins. Calyx-lobes all acuminate, one lanceolate, 3-nerved, with transverse reticulations in the upper half, about 10 mm long, 2.1 mm wide, two linear, 9 mm long, the fourth one cleft to within 4 mm of the base, the lobes about 2 mm wide, with a prominent midnerve and each with a pair of marginal nerves, all the segments slightly ciliate on the margins, otherwise glabrous. Corolla 8 mm long, white, glabrous, the tube slightly constricted, the lobes four, subequal, oblong, obtuse,

about 2.5 mm long, 1 to 1.2 mm wide. Capsule oblong, 6 mm long, 2 mm wide, glabrous.

LUZON, Province of Bataan, Lamao River, *Williams 37*, October, 1903 (type), *Merrill 3119*, October, 1903, *Whitford 493*, July, 1904, on damp shaded banks along the stream at an altitude of 150 meters or less.

One of the specimens (*Whitford 493*) was identified by the late C. B. Clarke as *Lepidagathis incurva* Don (*L. hyalina* Nees), but it seems to me to be specifically distinct from that species. The brown or brown-purplish color of the spikes is characteristic. It is the form previously reported by me as *Lepidagathis incurva* Don.[10]

LEPIDAGATHIS SUBINTERRUPTA sp. nov.

Herba parva, prostrata, ramis floriferis suberectis, vix 10 cm altis, inflorescentiis exceptis glabra; foliis parvis, oblongis, usque ad 2.5 cm longis, breviter petiolatis, obtusis vel obscure acuminatis; spicis terminalibus, gracilibus, plus minusve interruptis, solitariis vel subfasciculatis, terminalibus, usque ad 5 cm longis; calycis segmentis bracteisque leviter ciliatis capitato-glandulosisque.

A small prostrate herb, glabrous except the inflorescence, the stems 4-angled, slender, rooting at the nodes, the flowering branches erect or suberect, 10 cm high or less. Leaves in equal pairs, mostly oblong, chartaceous, 1 to 2.5 cm long, 4 to 8 mm wide, glabrous, somewhat shining, paler on the lower surface than on the upper, both surfaces with small scattered cystoliths, the base acute or somewhat decurrent-acuminate, the apex obtuse or obscurely acuminate; petioles 1 to 3 mm long. Spikes terminal, solitary or at most three together, slender, interrupted, 1 to 5 cm long, about 5 mm in diameter, the flowers somewhat scattered. Bracts and bracteoles similar, lanceolate, acuminate, 3 to 4 mm long, less than 1 mm wide, 1-nerved, slightly ciliate and capitate-glandular. Calyx-segments 5, 3 to 4 mm long, obscurely ciliate and slightly capitate-glandular, one about 1.2 mm wide, the other four similar but less than 1 mm wide. Corolla white, 4 mm long, the tube not contracted, the upper lip 1.5 mm long, 1.1 mm wide, rounded or very obscurely retuse, the lower one 3-lobed, the lobes about 1 mm long, 0.8 mm wide, obtuse. Capsule glabrous, 4 mm long, the seeds brown, about 1 mm in diameter.

LUZON, Province of Isabela, San Luis, *Bur. Sci. 8024 Ramos*, May, 1909, on bowlders along shaded streams.

A species probably most closely allied to *Lepidagathis laxa* Nees, differing especially in its much smaller leaves.

[10] Philip. Journ. Sci. 1 (1906) Suppl. 125.

LEPIDAGATHIS MACGREGORII sp. nov.

Species *L. laxae* Nees ut videtur affinis, differt foliis oblongo-ovatis, multo majoribus, usque ad 12 cm longis, 5 cm latis, floribus 4-meris, spicis longioribus, calycis segmentis bracteisque leviter ciliatis, vix glandulosis.

Erect, nearly glabrous, the branches quadrangular, slender, often somewhat puberulent at the nodes, reddish-brown. Leaves in equal pairs, membranaceous, glabrous, oblong-ovate, 10 to 12 cm long, 4.5 to 5 cm wide, somewhat shining when dry, slightly paler on the lower surface than on the upper, the base rather abruptly and shortly decurrent-acuminate, the apex acute or slightly acuminate, margins somewhat undulate, both surfaces with small, scattered cystoliths, the lower one sometimes slightly puberulent along the midrib; lateral nerves 7 or 8 on each side of the midrib, curved, anastomosing; petioles 1 cm long or less. Spikes fasciculate, from one to three on each peduncle, the peduncles very short or up to 4 cm in length, crowded in the upper axils, the spikes slender, 2 to 6 cm long, 5 to 6 mm in diameter. Bracts and bracteoles similar, lanceolate, acuminate, 1-nerved, 4 to 5 mm long, 1.2 mm wide, margins slightly ciliate with short hairs, otherwise glabrous, not at all glandular. Calyx-segments all acuminate, slightly ciliate on the margins, not glandular, one lanceolate, 5 mm long, 1.3 mm wide, very obscurely 3-nerved, not reticulate, two linear-lanceolate, less than 1 mm wide, the fourth cleft to within 2.5 mm of the base, the lobes lanceolate, about 1 mm wide. Corolla apparently white, 5 mm long, glabrous, the tube not or very slightly contracted, the upper lip elliptic-ovate, slightly retuse, 1.5 mm wide, the lower one cleft into three, oblong, obtuse lobes, about 2 mm long, 1 mm wide. Anthers about 0.8 mm long. Capsule 4.5 mm long, glabrous except the puberulent apex.

MINDORO, Baco River, *McGregor 128*, March 15, 1905.

A species well characterized by its slender, nearly glabrous spikes; it is similar to *Lepidagathis laxa* Nees in some respects, but differs from that form in the points indicated in the diagnosis; from *L. incurva* Ham., to which it is also manifestly allied, it differs in its slender, nearly glabrous spikes.

LEPIDAGATHIS HUMILIS sp. nov.

Herba parva, plus minusve prostrata, ramis floriferis erectis vix 10 cm altis; foliis in paribus inaequalibus, breviter petiolatis, ovatis vel late ovatis, usque ad 2 cm longis, basi late truncatis, rariter leviter cordatis vel decurrentibus; spicis axillaribus terminalibusque, solitariis, laxis, angustis, usque ad 5 cm longis, vix 5 mm latis, calycis lobis bracteisque vix ciliatis, leviter hispidis.

A small, nearly glabrous herb, the stems prostrate and rooting at the nodes, 4-angled, obscurely puberulent or glabrous, the flower-bearing branches erect, slightly branched, less than 10 cm tall. Leaves in unequal pairs, the larger ones of each pair ovate to broadly ovate, 1.5 to 2 cm long, about 1.5 cm wide, the base broad, truncate or sometimes subcordate, rarely somewhat decurrent, the apex acute or blunt, margins slightly undulate, the smaller leaves of each pair similar but less than one-half as large, both surfaces with small, scattered cystoliths; petioles 3 mm long or less. Spikes terminal and axillary, solitary, slender, 1 to 5 cm long, less than 0.5 cm in diameter, somewhat interrupted, the bracts and bracteoles similar, broadly lanceolate, acuminate, 1-nerved, about 3 mm long, 0.8 mm wide, very slightly hispid, not ciliate nor glandular. Calyx-segments all acuminate, obscurely hispid with short hairs, not ciliate, 3 to 4 mm long, one 1.2 mm wide, very obscurely 3-nerved, very obscurely reticulate above, two narrowly lanceolate, 0.7 mm long, 1-nerved, the fourth cleft to within 1.5 mm of the base, the lobes lanceolate, 1-nerved. Corolla 4 mm long, pale pink, glabrous, the tube not constricted, the upper lip 1.5 mm long, 1.1 mm wide, rounded, the lower one 3-cleft, the lobes elliptic-ovate, obtuse, nearly 1 mm wide. Anthers 0.6 mm long, the cells parallel.

MINDANAO, District of Davao, Santa Cruz, *Williams 2955*, June 19, 1905.

A species perhaps as closely allied to *Lepidagathis tenuis* C. B. Clarke as to any other Philippine species, but quite distinct from that form. Well characterized by its small size, small, unequal, broadly ovate, short-petioled leaves and its slender, nearly glabrous spikes.

RUELLIA Linnaeus

RUELLIA PANAYENSIS sp. nov.

Species *R. nudispicae* C. B. Cl. affinis, differt brevissime petiolatis, inflorescentiis fasciculatis haud solitariis tenuioribus, interdum ramosis.

An erect herb about 20 cm in height, simple or sparingly branched, the stems terete, 2.5 mm in diameter or less, ciliate-hirsute, the younger parts rather densely so. Leaves oblong-ovate, chartaceous, 4 to 9 cm long, 2 to 4 cm wide, somewhat olivaceous, shining, apex rounded, base acute or subacute, the upper surface glabrous, the lower more or less hirsute with short hairs especially on the midrib and nerves, margins entire or obscurely undulate; lateral nerves about 8 on each side of the midrib, slender; petioles pubescent, 3 to 5 mm long. Inflorescence mostly spikelike, apical, fascicled, 3 or 4 from each stem, 8 to 12 cm long, slender, glabrous or very slightly pubescent,

occasionally branched, mostly simple. Bracts linear, 2, acuminate, 2.5 mm long. Sepals 5, equal, linear-lanceolate, acuminate, about 8.5 mm long, 1 mm wide, slightly pubescent, free to the base. Corolla (very young) apparently about 1 cm long; stamens 4, all fertile, the anthers 2-celled, cells contiguous. Ovary oblong, glabrous; style-arms one only, short. Capsule linear, slightly pubescent, 8 to 9 mm long, 1.5 mm wide, the sides parallel, seed-bearing to the base. Seeds about 12, on retinacula, somewhat compressed, about 1 mm in diameter.

PANAY, Capiz, *Bur. Sci. 21236 Escritor*, June, 1913.

It is not entirely clear that the specimen came from Panay, as from the field label it seems probable that it was collected on the neighboring Island of Romblon; the locality is given simply as "Capiz, Mount Romblon." The species is manifestly allied to *Ruellia nudispica* C. B. Clarke (*Gymnostachyum nudispicum* Elm.), which is a true *Ruellia* in the sense that Clarke and Lindau interpret the genus; it differs notably in its inflorescence which consists of fascicled spikes, rarely branches, instead of solitary spikes.

HEMIGRAPHIS Nees

HEMIGRAPHIS BAKERI sp. nov.

Planta parva, glabra vel subglabra, circiter 20 cm alta, parce ramosa, ramulis plus minusve geniculatis, tenuibus; foliis in paribus aequalibus, obovato-oblongis, obtusis, integris vel leviter undulatis, basi angustatis, cuneatis, usque ad 3 cm longis; spicis tenuibus, paucifloris, bracteolis angustis, quam sepalis haud latioribus, 4 ad 5 mm longis; calycis lobis lineari-lanceolatis, acuminatis, circiter 5 mm longis, glabris; corolla 11 mm longa; capsulis lineari-oblongis, 7 mm longis, 1.7 mm diametro, seminibus circiter 12.

A small, nearly glabrous, sparingly branched plant 20 cm high or less, the branches slender, more or less geniculate in the lower part, the very young ones slightly pubescent, soon quite glabrous. Leaves opposite, those of each pair equal, oblong-obovate; chartaceous greenish-olivaceous when dry, with prominent cystoliths on the upper surface, apex rounded to obtuse, base gradually narrowed, cuneate, margins entire or obscurely undulate, 1 to 2.5 cm long, 4 to 8 mm wide, the lateral nerves about 4 on each side of the midrib, slender; petioles 2 mm long or less. Spikes terminal, slender, few-flowered, up to 5 cm long, the flowers distant, bracteoles not imbricate except toward the tips of the spikes. Calyx about 8 mm long, glabrous, the tube 3 mm long, the lobes 5, linear-lanceolate, acuminate, equal, about 0.6 mm wide below. Corolla about 11 mm long. Anthers 1.3 mm long. Capsule linear-oblong, about 7 mm long, 1.7 mm wide, apiculate, glabrous,

not at all clavate. Seeds about 12, brown, slightly compressed, obtuse, base inequilaterally cordate, somewhat shaggy-ciliate, about 1.5 mm long. Bracteoles linear, 4 to 5 mm long, green, 1 mm wide or less, the lower ones slightly spatulate, glabrous.

LUZON, Province of Tayabas, hills near Malimao, *C. F. Baker 3272* (type), May 7, 1914. SAMAR, *For. Bur. 21081 Sherfesee, Cenabre, & Cortes*, April, 1914.

A species probably belonging in the group with *Hemigraphis fruticulosa* C. B. Clarke, but nearly or quite glabrous, with entirely differently shaped leaves and relatively very narrow bracteoles.

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STUDIES IN RICE[1]

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FIVE PLATES

RICE SEED SELECTION

Seed selection and improvement of rice receives very little attention in the Philippine Islands. In general, the importance of selection is not recognized, and seed is usually not cleaned and well graded. In sowing there is frequently a mixture of two or more varieties differing decidedly in texture, quality, and yield. In short, the seed usually possesses no recommendation or qualification other than availability.

It is not uncommon for the farmer to sell most of his product at a low price and to replace it at planting time at an exceedingly high cost. This practice often forces him to go without seed at planting time or to mortgage his future crop, thus sacrificing all profit. Crop improvement cannot follow along these haphazard lines. A system of farming in which there is not a careful selection and retention of selected strains is doomed to mediocrity or failure. The best agricultural practice, based upon scientific investigation, now demands careful seed selection.

HOW TO SELECT SEED

The Bureau of Agriculture has demonstrated [2] the fact that a high degree of productivity; uniformity in texture, quality, color of hull or cuticle; or uniformity in the general characters of the

[1] I wish to thank Mr. H. O. Jacobson, of the Bureau of Agriculture, for valuable assistance in the writing of this article. He not only carefully criticized the article, but he placed at my disposal the experimental data of the Bureau of Agriculture and furnished some of the photographs. Credit is also due to Prof. C. F. Baker, of the College of Agriculture, for helpful suggestions.

[2] Jacobson, H. O., Phil. Agr. Rev. 7 (1914) 346–351.

plant is impossible when seed selection is based upon a composite sample of the ordinary varieties of rice. Considering that there is an almost unlimited number of Philippine varieties, that planting and harvesting operations for the past centuries have resulted in a great many combinations of the forms, and that there is more or less variation within a supposedly pure variety, standardization or purification of varieties cannot be expected when the seed is taken from the common market stock. One of the ordinary samples of rice—only one of many examined at the College of Agriculture—was found to include three distinct varieties, differing in texture, shape and size of grain, and color of hull and of cuticle. Frequently, samples which had been carefully graded and were apparently uniform were found to be, when hulled, nonuniform in color of cuticle and in texture of endosperm.

Selection must be confined to the product of a few individual plants. In this way it is possible to govern the variation by eliminating many of the undesirable characters possessed by ordinary individuals and to standardize or purify the varieties.

The work done by H. O. Jacobson,[3] Bureau of Agriculture, on the "Head-to-the-row test of rice" is ample evidence of the fact that selection must be limited to a few exceptional plants within a variety, and that this method results in rapid improvement, high uniformity in yield, and a consequent accumulation of desirable characters (Plate II, figs. 1, 2; Plate VI).

TIME TO SELECT SEED

The practice of delaying seed selection until planting time and of using either a part of the former crop for seed or of securing seed from a neighbor's general crop does not provide for seed improvement nor insure results above the average. Seed selecting should be done at harvest time. The farmer should go through his field and remove enough of the most desirable plants to furnish his seed for another year. This will enable him to base his final selection upon plants having a large number of similar panicles of good size, large stools, stiff stems, or any other characters which he considers desirable (Plate V, fig. 1).

The production of pure pedigreed varieties of uniformly high yield demands careful grading and rigid elimination. Only a few exceptional plants with the most desirable combinations of characters should be used. For this reason the number of plants

[3] Phil. Agr. Rev. 7 (1914) 346–351.

removed should be large enough to allow for the most careful discrimination and elimination.

After removal, the plants should be graded according to uniformity in number and character of panicles and in character of stooling. All the panicles of one plant will be similar in color of hull and of cuticle, in texture, and in awn characters.

The plants finally selected should be carefully described as suggested in the outline for describing the rice plant and palay, recently published.[4]

It is also necessary properly to number the plants to facilitate planting operations. The seed should be planted according to the Jacobson "head-to-the-row" method for the best, most rapid, and certain results.

Patient, conscientious work in properly recording the behavior of the culture and proper elimination of the undesirable individuals or varieties after row tests have been made will result in the production of pure and superior strains within from two to four generations. The ready response to selection and the rapid rate of reproduction will enable the breeder, within a few years, to sell an abundance of pedigreed seed.

The farmer should not hesitate to pay high prices for superior pedigreed seed. It is not usually economical for him to breed his own seed when he can purchase the pedigreed stock in his region. When first-class seed is not available, or after the farmer has once been supplied with it, he should continue to select his own seed.

In general practice the ordinary farmer may not be able carefully to grade his plants nor to appreciate the importance of grading. However, he should be trained not to mix varieties, and to make his seed selection from the high-yielding individuals in the best standard varieties.

CLEANING AND GRADING

The use of cleaned, well-graded seed will insure strong vigorous seedlings and will guard against an uneven stand with its attendant ills, such as weeds and poor total yield.

The seed may be cleaned by hand, by the water-gravity method, or by the use of a fanning mill. When a mill is not available, or if the amount of palay needed for seed is small, the grain can be winnowed in strong wind and most of the light or immature seed and the dust can be separated. The final grading of the seed according to size can be done by hand with the use

[4] Rundles, J. C., Phil. Agr. & For. 3 (1915) 181–190.

of screens. This work should not be delayed until planting, when time is valuable.

The water-gravity method is a very speedy and thorough way of cleaning palay. Small amounts may be placed in jars, buckets, or troughs of water. The small, immature, or undesirable grains and light foreign matter will rise to the top and overflow or they can be removed. The seed should not be in the water longer than the work requires and should be dried thoroughly and quickly. This process may be carried on at any time, as it in no way injures the seed.

When there are several cavanes [5] of palay to be cleaned, the grain may be taken to a fanning mill—which is usually available—where the work may be done at small expense.

FACTORS WHICH SHOULD GOVERN THE SELECTION OF STANDARD VARIETIES OF RICE

PRODUCTION

In determining the value of any variety of rice, yield is of first consideration. The tendency to yield well or to withstand adverse conditions may be the deciding factor in favor of retaining varieties which, on account of inferior quality, undesirable color of cuticle, or low percentage of grain, would otherwise be eliminated. A heavy crop of even inferior quality is more desirable than a small crop of high quality.

However, a variety must be such that it will produce big crops in the average season, not in a few especially favorable seasons only.

In every province a large number of varieties are regularly planted which cannot, or do not, produce normal crops except in an unusually favorable season. For example, in some regions there is regularly planted a six-months rice which will not have sufficient rainfall to produce a normal crop one year in ten.

A variety may be prized by the best markets and yet its production may be unprofitable on account of poor yield, more or less loss in harvesting, due to a tendency to shatter, or because of a high percentage of breakage in milling. Long, slender grains break very readily (Plate I, fig. 3). Varieties of rice having grains about 7 mm in length and 3.5 mm in width and as thick as possible will better withstand the milling process. These varieties produce the maximum amount of head rice,[6] which largely determines the value of a crop.

[5] One cavan equals 25 gantas, equals 75 liters.

[6] The head rice is the whole rice left in the milling process.

Any variety should be discarded which, under ordinary conditions, fails to produce a crop large enough to cover the entire cost of production plus a reasonable profit. At least 50 per cent of the marketable rice of the Islands is produced under a very small margin of profit. In many cases, as there is no actual cash spent in producing the crop, the farmer does not realize that the balance is on the wrong side of his ledger.

The great wealth of the Philippine varieties of rice makes it possible for the farmer to select varieties superior not only in yield but in all the essential points.

MARKET DEMAND

The most highly valued rice in the best markets of the world is superior in appearance and texture. Attractiveness is produced by highly polished, entire grains of uniform size. The grain must be corneous or largely corneous in texture to take the best polish. Rice of this kind is often spoken of as nonglutinous. It is transparent, dense, and free from soft starch spots. When properly cooked, it remains intact and has a pleasing appearance.

The Philippines, however, have no rice to export. The real problem in the Islands is the production of rice in sufficient quantities to meet the demands of the people. The rice most universally used in the Islands is partly, or largely, corneous in texture. This kind takes a good polish, is nutritious, and furnishes the maximum amount of energy. The demand for polished rice is limited.

Good cooking quality is indicated when the rice kernel retains its shape after being cooked, yet is soft and has a pleasing flavor. A variety which forms a pasty mass, soon after being cooked, is not desired. Likewise a variety is undesirable when it is firm or hard or without flavor when cooked.

As long as rice is the chief article of diet in the Philippines, and the production is not sufficient to meet the local demand, it is not advisable to encourage the practice of polishing rice, thus not only sacrificing flavor and nourishment, but also running the risk of spreading the common Philippine disease, beriberi, and ultimately of sacrificing yield for polish.

Some varieties of rice are highly prized in certain localities because of very pronounced flavor or odor when freshly harvested or for other special reasons. Starchy or glutinous rice always commands a good price as long as the supply is not excessive. When cooked, it is sticky and rather hard to digest. Its value lies in its desirability as a foundation for pastries.

The small grower may well cater to the local demand for starchy rice, but the extensive grower will find it more profitable to keep to the varieties most generally demanded.

MATURITY

High production does not depend upon the length of time required for maturing a crop. Early-maturing varieties, varieties which mature in from one hundred twenty to one hundred fifty days, often yield as well as, or even better than, late ones.

According to the experience of the Bureau of Agriculture varieties maturing in one hundred twenty, one hundred fifty, one hundred eighty, two hundred ten, and two hundred forty days were very similar in yield. Varieties maturing in less than one hundred twenty days do not, as a rule, yield as well.

The advantages generally given in favor of the early varieties are: They give the quickest returns; the crop is exposed for a minimum time to the ravages of insects or to destruction by storms or animals; the optimum conditions for growth are more frequently met; and the growth of a second crop the same year—rice, legume, or vegetable—is possible and consequently the ground is more economically used.

When transplanting is done at the beginning of a long rainy season, conditions may warrant the use of late-maturing varieties. In this case varieties which would ripen about the end of the wet weather may be used. The later transplantings need not, however, be late-maturing varieties.

CHARACTER OF PLANT

Varieties of rice vary in the stooling tendency. The fact that high production is correlated to some extent with the size of the stool is self-evident. There has not been sufficient experimentation with rice thus far to determine the most productive size of stool, but a stool of about ten stems is considered the most practical. An extremely large stool is undesirable, as it tends to cause nonuniformity in ripening, the later stems maturing later. If a variety has a tendency to stool excessively, the size can be controlled by increasing the number of plants per given area.

As rice is grown chiefly for the grain—the straw having very little value—rankness of growth is undesirable. Rank-growing varieties fall down easily, thus involving greater work in harvesting as well as in the proper care of the straw. Pref-

erence should always be given, other conditions being equal, to varieties of ordinary-sized plants having stiff straw and standing well.

H. O. Jacobson describes the ideal rice plant as follows:

> An upright plant consisting of many stems bearing heads not less than 6 in number—more is preferable; the heads borne at a height of from 1 to 1½ meters from the ground, but all at a uniform height. The heads of medium size for the variety with the prevailing size of kernel; the bearing stems should be stiff and strong; the leaves of good size; there should be no disease on the plant; grains should stick tightly to the head so as not to shatter easily and the hulls thin and of light color.

According to a report of the Bureau of Agriculture the size of grain does not affect the yield. When the number of seeds per panicle is excessive, then the size is correspondingly small. Accepting this report as true, small-seeded varieties are undesirable for the following reasons: The seed is more difficult to sow properly when broadcasting is the method of distribution; it is more frequently attacked by birds; it requires greater care in milling; and the loss due to milling is greater than that for the average-sized grain.

CHARACTERS OF PALAY

Awned or awnless.—The following arguments are given for and against the awned and the awnless varieties:

While the awned varieties are more difficult to harvest, the grains do not shatter readily in the field and they are less subject to attack by birds. However, the awn or beard is disagreeable when handling the crop and is injurious to the feet of animals in threshing.

Among the Visayans the awnless variety is used almost exclusively, while among the Ilocanos the awned varieties are preferred. As long as yield or quality is not sacrificed, the grower should use his own judgment in deciding which kind to raise.

In the general markets palay, or rough rice, with light-colored hull, commands the best prices. No doubt this is due to the fact that a dark hull frequently indicates a colored cuticle or undesirable quality.

The percentage of hull by weight for the 200 varieties of rice examined at the College of Agriculture varied from 14 to 40 per cent. A thin hull is most desirable and should receive consideration when the value of a rice is being determined. Thin-hulled palay is not only heavier per given volume, but yields a larger amount of edible product than thick-hulled.

NURSERY SEED BEDS FOR RICE

There are certain general principles involved in the preparation of all seed beds. Seed beds for rice are no exception; good results are obtained only when the general requirements are met. They may be summarized as follows:

Soil requirements. Any soil easily worked, not too sandy nor too heavy.
Abundant moisture.
Preparation. Thorough working of soil prior to time of planting.
Fertility. Yearly application of well-rotted manure. Seedlings demand large quantities of available food.
Protection. Fences to prevent animal invasion and scarecrows and special devices to prevent the attacks of birds.

There are several methods of preparing seed beds in the Islands. The following is the one most universally used in the different regions; it is known as *punláan* (Tagalog), *pagbonobonan* (Ilocano), and *saboran* (Visayan).

The preparation of the seed bed usually begins about the time the light rains commence. This enables the farmers to produce seedlings for transplanting at the beginning of the rainy season. Other beds are made later to provide seedlings for later transplantings.

The beds are often located on a part of the rice paddy, in a garden, or in a small area near the farmer's home. Sometimes manure is used; again the bed may occupy the place formerly occupied by the threshing operations and some fertility is provided for in that way.

The soil is plowed and harrowed both ways until it is very fine. Then it is divided into beds which are about 3 or 4 meters wide.

Soaking the palay in water for from twenty-four to thirty-six hours, then draining and allowing it to germinate before sowing, is practiced to some extent, especially among the Tagalogs. When properly done, soaking aids in grading the seed; hastens germination, thus giving birds less opportunity for pillage; and may increase the percentage of germination. However, it requires careful attention, or, due to a delay in the sowing or to insufficiency of water after sowing, it may result unsatisfactorily.

Broadcasting is the most universal method of sowing the seed. especially among the Tagalogs and Visayans. In this case the seed is scattered by hand over the surface of the bed and is covered either by a thin layer of dirt from near by or by harrowing with a bamboo harrow, or a sufficiently soft bed is

provided so that no covering process is required when the weather is wet.

Drilling seeds in rows is not a common practice, but it is done to some extent. Among the Ilocanos and Pangasinans a hill method of sowing the seed bed is very commonly used. To perform the work most advantageously, three persons are often used—one to make holes, another to drop the seed, and a third to cover. The first person, walking backward, makes the holes with a sharpened, two-pronged stick. He can make six rows of holes as he goes. The hills are about 10 centimeters apart and 3 or 4 centimeters in depth and in diameter. From 6 to 20 seeds are dropped in a hole and are covered by a third person—usually a woman, with her hand or foot.

The following are the special methods of making nursery seed beds. They are not universally used.

Palusot.—This method is described as used in Nueva Ecija and Bulacan Provinces. It calls for the preparation of the ground when under water or when saturated. The seed is germinated and scattered broadcast on the water or mud, where it settles more or less unevenly, most of the growth taking place in a muddy seed bed. The advantages claimed for this method are maximum germination and rapid growth, while the disadvantages are uneven sowing due to the water and difficulty in separating the seedlings.

Dapog.—This practice is described as used in Rizal Province. It is a unique method of growing seedlings upon a raft in a river. A bamboo frame is constructed in the form of a raft—split bamboo woven together forms the floor. Green algæ and rotten compost are gathered from along the river and a layer of each is placed on the prepared frame to a depth of about 5 centimeters. The frame is placed in the river, ready for the seed which has previously been soaked about thirty-five hours. The seed is scattered on the prepared bed. Due to the abundant supply of moisture, growth is very rapid. Within from ten to fifteen days the seedlings will be about 15 centimeters in height and ready for use. They are cut and removed in blocks and floated on the raft to the transplanting ground.

The following advantages are claimed for this method: Rapid growth, maximum percentage of germination, comparative freedom from such damages as often occur when seed beds are on the land, and ease of transportation of seedlings.

The disadvantages are: The work involved in preparation of raft, the necessity occasioned for transplanting seedlings

while small or for thinning at a later date, and difficulty involved in separating the desirable number for transplanting in a place.

Dapug.—This method is described as used in Rizal and Bulacan Provinces. A framework of bamboo is placed on mud and is covered with a mat of banana leaves woven together. The seed, usually germinated previously, is sown very thickly on a thin layer (about 5 centimeters) of decomposed organic matter cut into fine pieces. Due to the abundant moisture furnished from below, growth readily takes place. Within from twelve to fifteen days the seedlings are either rolled up and placed on a well-prepared seed bed or are transplanted into the field.

THE AMOUNT OF SEED TO USE ON THE SEEDLING BED

The amount of seed to use on the seedling bed is a very important question, the discussion of which depends upon the presentation of certain data shown in the following table:

TABLE I.—*Showing number of seeds of unhulled rice required to make a given unit and the number of seedlings to expect.*

Variety.	Seeds per cavan.[a]	Seeds per ganta.[a]	Awned or awnless.	Length	Width.	Thickness.	Seedlings per cavan.
				mm.	*mm.*	*mm.*	
Matoyosa	1,134,000	45,360	Awnless	10.0	4.0	2.3	907,200
Quinarabao	1,350,000	54,000	do	8.3	3.9	2.2	1,080,000
Cabyod	1,552,000	62,080	do	6.7	3.3	2.5	1,241,600
Penerencipe	1,578,000	63,120	Awned	9.2	3.1	2.0	1,262,400
Castaña	1,638,000	65,520	do	7.1	3.6	2.2	1,310,400
Castanonga	1,647,000	65,880	do	7.0	3.5	2.5	1,317,600
Catorsa	1,687,000	67,480	Awnless	8.9	3.1	2.1	1,349,600
Bolalaque	1,760,000	70,400	Awned	9.0	3.2	2.1	1,408,000
Caniñi	1,773,000	70,920	Awnless	9.3	3.2	2.2	1,418,400
Luzon Ilocano	1,779,000	71,160	Awned	8.3	3.3	2.4	1,423,200
Grano	1,968,000	78,120	do	8.3	3.6	2.1	1,574,400
Balalangonon	2,080,000	83,200	Awnless	7.0	3.7	2.2	1,664,000
Malay	2,093,000	83,720	do	6.2	3.5	2.0	1,674,400
Initiw	2,100,000	84,000	do	7.3	3.1	2.0	1,680,000
Caloco	2,135,000	85,400	do	8.4	3.0	2.0	1,708,000
Leon	2,200,000	88,000	do	6.1	3.6	2.1	1,760,000
Caborit	2,205,000	88,200	do	6.2	3.1	2.0	1,764,000
Dalusong bayad	2,221,000	88,840	Awned	7.8	3.2	2.2	1,776,800
Lumangbas	2,273,000	90,920	Awnless	6.1	3.1	2.3	1,818,400
12 c 105	2,464,000	98,560	do	5.0	3.0	2.0	1,971,200
Put-yo-canon	2,482,000	99,280	do	6.0	3.1	2.1	1,985,600
Quenocoryec	2,492,000	99,680	do	6.5	3.1	2.2	1,993,600
Quenorales	2,554,000	102,160	do	6.0	3.1	2.1	2,043,200
Maguindanao	2,606,000	104,240	do	6.0	3.1	2.1	2,084,800
Canyan	3,387,000	135,480	do	5.0	3.1	2.2	2,709,600

[a] One cavan equals 25 gantas, equals 75 liters.

From Table I it appears that in the different varieties of rice there is a wide variation in the number of seeds per cavan. This variation is a result of the difference in the size of the individual grains and in the awn character.

The varieties should be classified as to the number of seeds per cavan in order to make allowance for the great variation. A cavan of palay with seeds of the smaller type may contain twice as many seeds as a cavan of the larger type. For this reason three groups are established:

Group A (large). This may include the varieties which have large-sized grains or medium-sized ones having the awn character or those varieties which require up to 1,650,000 unhulled grains to make a cavan. This group is represented in Table II with 1,500,000 as an average.

Group B (medium). This group includes the varieties which have medium-sized grains or small grains having the awn character. It may include varieties requiring from 1,650,000 to 2,250,000 grains, to make a cavan. It is represented in Table II with 2,100,000 as an average.

Group C (small). This group includes the varieties which are small, requiring more than 2,650,000 grains to make a cavan, and is represented in Table II with 2,700,000 as an average.

Two varieties of palay similar in dimensions but differing in the awn character usually fall into different groups—the awned requiring the lesser number of grains to make a cavan. (Compare balalangonon with castaña, Table I.)

It is important for the farmer to know the approximate number of seeds required to make a cavan in order to have some knowledge of the number of seeds sown on a given area. A little practice in counting enables him to classify varieties.

In the class room in the College of Agriculture the boys counted a definite volume of seeds representing different varieties and scattered the seeds at varying distances over a surface of a square meter—both broadcast and in rows. The exercise trains the eye to note differences in size of grain and variation in the rates of sowing. When the seeding rate is excessive, that fact is made very evident.

The number of seedlings given in Table I are estimated upon a germination of 80 per cent, thus allowing for a possible loss of 20 per cent in the seed bed.

TABLE II.—*Size and area of seed beds needed for different sizes and quantities of palay.*

Rate of sowing per square meter.	Seed bed needed for—			
	1 cavan of seed.		1 ganta of seed.	
	Dimensions.	Area.	Dimensions.	Area.
Seeds.	*Meters.*	*Sq. m.*	*Meters.*	*Sq. m.*
GROUP A (LARGE); 1,500,000 SEEDS PER CAVAN; 20,000 SEEDS PER LITER.				
1,000	5 by 300	1,500	5 by 12	60
1,500	5 by 200	1,000	5 by 8	40
2,000	5 by 150	750	5 by 6	30
2,500	5 by 120	600	5 by 4.8	24
3,000	5 by 100	500	5 by 4	20
4,000	5 by 75	375	5 by 3	15
5,000	5 by 50	300	5 by 2.4	12
7,500	5 by 40	200	5 by 1.6	8
10,000	5 by 30	150	5 by 1.2	6
12,000	5 by 25	125	5 by 1	5
15,000	5 by 20	100	5 by 0.8	4
GROUP B (MEDIUM); 2,100,000 SEEDS PER CAVAN; 28,000 SEEDS PER LITER.				
1,000	5 by 420	2,100	5 by 16.8	84
1,500	5 by 280	1,400	5 by 11.2	56
2,000	5 by 210	1,050	5 by 8.4	42
2,500	5 by 168	840	5 by 6.72	33.6
3,000	5 by 140	700	5 by 5.6	28
4,000	5 by 105	525	5 by 4.2	21
5,000	5 by 84	420	5 by 36	16.8
7,500	5 by 56	280	5 by 2.24	11.2
10,000	5 by 42	210	5 by 1.68	8.4
12,000	5 by 35	175	5 by 1.4	7
15,000	5 by 28	140	5 by 1	5
GROUP C (SMALL); 2,700,000 SEEDS PER CAVAN; 36,000 SEEDS PER LITER.				
1,000	5 by 540	2,700	5 by 21.6	108
1,500	5 by 360	1,800	5 by 14.4	72
2,000	5 by 270	1,350	5 by 10.8	54
2,500	5 by 216	1,080	5 by 8.6	43.2
3,000	5 by 180	900	5 by 7.2	36.0
4,000	5 by 135	675	5 by 5.4	27
5,000	5 by 108	540	5 by 4.32	21.6
7,500	5 by 72	380	5 by 2.88	14.4
10,000	5 by 54	270	5 by 2.16	10.8
12,000	5 by 41	225	5 by 1.8	9
15,000	5 by 36	180	5 by 1.44	7.2

Table II shows that when 1 cavan of palay of group A is sown at the rate of 2,500 seeds per square meter it requires a

seed bed containing 600 square meters. At the same rate of sowing, 1 cavan of group B would necessitate a bed of 840 square meters, and 1 cavan of group C would take a bed of 1,080 square meters. In short, when the rate of sowing remains the same, the variation in the area of seed bed to correspond to the variation in number of seed per cavan may be expressed by the numbers 2, 3, 4.

The table also shows that the area of the seed bed required for a cavan of any one group varies according to the rate of sowing. The maximum rate given in the table requires a seed bed one-tenth as large as the one needed when the palay is sown at the minimum rate. The practical question is: What is the optimum rate of sowing? It is a common tendency to sow the seed too thickly, since this requires a seed bed of smaller area, and consequently much less work.

Ordinarily the palay is scattered by hand on the seed bed and is not distributed uniformly. The amount of seed used varies greatly not only for different regions, but also for the same grower and the same region. Actual counts of the number of seeds scattered on 1 square meter of seed bed showed that number to vary from 3,000 to 15,000. The latter number allows for 150 seeds per square decimeter, or 59 seeds per square inch. Ordinary judgment dictates that this larger number is excessive. The smaller amount, which averages 12 seeds per square inch, more nearly represents the optimum when the seeds are properly graded. It is commonly maintained that allowance must be made for inferior seed, dirt, and insects, but this practice is not founded on sound agricultural principles. Good seed is the first essential, and the amount used per unit of area should be based upon a uniformly first-class product. The number of seeds used should nearly correspond with the number of plants which are desired per unit of area. The use of a greater amount, just to make allowance for poor seed, is sure to end in nonuniformity and poorer average results.

When the seedlings are transplanted before they are fifteen days old—the practice in some regions [7]—the bad results of overcrowding in the seed bed may possibly be avoided. Thinning after transplanting, which is sometimes practiced, usually requires more work than would be necessary in the preparation of a larger seed bed for the same amount of seed.

Ordinarily seedlings which require a growing period of from thirty to forty-five days are in demand. However, the time re-

[7] Rizal Province.

quired depends upon the maturing term of the variety and the optimum age for transplanting. Some long-maturing, hardy varieties of rice can be transplanted with good results when 40 or 45 days old, while other varieties requiring less time to mature must be transplanted before they are 30 days old. When transplanting is delayed until the internodes begin to lengthen, the plant can never recover from the injury, due to late transplanting. According to experiments of the Bureau of Agriculture, about thirty to thirty-five days is the optimum time required for growing most varieties.

NURSERY SEEDLING EXPERIMENT

In order to determine the best method and the optimum rate of sowing the nursery seed bed, the following experiment was conducted at the College of Agriculture, the student members of the agronomy classes helping with the work.

A seed bed (4 by 12 meters) located in the nursery was well prepared and the seed sown February 13, 1915. As the rainfall is limited at this season of the year, an abundance of water was supplied by subirrigation and sprinkling—the water coming from a near-by stream.

The bed was divided lengthwise into four strips, the inner strips being fertilized with a mixture of compost, chicken manure, and dried blood at the rate of 4.5 gantas, containing 0.5 kilogram dried blood and 12 per cent nitrogen per square meter. The different rates of sowing the seed appear in Table III.

TABLE III.—*Showing the results of the seedling experiment.*

Rate of sowing.		Average height of seedlings.				Weight of 100 seedlings.			
		Fertilized.		Nonfertilized.		Fertilized.		Nonfertilized.	
Seeds per square meter.	1 liter seed per square meter.	Drilled.	Broadcasted.	Drilled.	Broadcasted.	Drilled.	Broadcasted.	Drilled.	Broadcasted.
		cm.	*cm.*	*cm.*	*cm.*	*g.*	*g.*	*g.*	*g.*
1,000	28.0	47	50	22	28	121	109	47	39
1,500	18.7	51	55	26	24	79	74	36	17
2,000	14.0	55	44	25	29	89	73	31	43
2,500	11.2	54	57	26	27	72	64	28	25
3,000	9.8	54	54	26	30	68	37	22	20
3,500	8.0	46	62	32	23	43	45	20	25
4,000	7.0	50	51	37	25	48	49	25	19
4,500	6.2	48	57	35	28	40	33	17	15
5,000	5.6	50	50	32	30	39	32	23	22
5,500	5.0	60	42	31	31	48	40	17	19
6,000	4.6	56	42	26	23	57	43	13	12
Averages		50	51	29	27	64	54.4	25.3	23.2

The following facts are deduced from Table III:

The fertilized drilled seedlings showed an average weight 18 per cent greater than the average weight of an equal number of broadcasted, fertilized seedlings. The nonfertilized drilled seedlings showed an average 9 per cent greater than the average weight of an equal number of broadcasted nonfertilized seedlings. The fertilized drilled seedlings showed an average weight which was 2.53 times as great as the average weight of an equal number of the nonfertilized drilled seedlings. The broadcasted fertilized plants showed an average weight which was 2.34 times as great as the average weight of an equal number of the nonfertilized broadcasted seedlings.

Increasing the number of seedlings per given unit of area tends to increase the height of the seedlings under fertilized conditions, but does not tend to produce a wholesome growth (Plate VI, fig. 1).

The weight of the seedlings shows a decrease as a result of less food material. The result was tall, spindling, or "leggy," seedlings with no indication of a stooling tendency. The good, stocky seedlings with the stooling tendency well exhibited were produced when the seeds were sown not to exceed 4,500 seeds per square meter with 1,500 seeds as the optimum amount (Plate VI, fig. 2). When the rate was higher than the above, inferior seedlings resulted.

The tendency to increased height in overcrowding was not noticeable under the nonfertilized conditions; otherwise the seedlings presented the same variation. The moderate rate of sowing produced hardier and stockier seedlings.

The seedling experiment shows results which harmonize with the established fact that good seedlings cannot be grown when the seed is too thickly sown. Wholesome growth is not possible when the plants are crowded or when they have insufficient food. Under crowded conditions the plants may grow tall, but they will be weak and spindling. When the seedlings are crowded it is very difficult at the time of transplanting to remove and properly separate the number desired to be set in a place without injuring the tender seedlings. Under these conditions too many plants are often used and overcrowding occurs in the hill. This is not only a waste of material and time, but it results in a waste of plant food in the field.

Experiments have not been made as yet to determine the final difference in the yield, other conditions being equal, between thrifty rice seedlings, well spaced in the seed bed, and seedlings

grown under crowded conditions. It is reasonable to suppose, and the fact has been generally established, that thrifty seedlings are essential to the best final results.

Experiments made thus far in the Islands for determining the proper number of seedlings to set in a hill have taken no account of the conditions under which the seedlings were produced. All the seedlings used were grown under crowded conditions.

Experimentation with seedlings grown under different rates of seeding, on fertilized and nonfertilized soil, is needed. Such work might give valuable information on conditions governing the optimum growth and the production of the individual plant. In the selection work it was learned that a large percentage of the stools were inferior, and that a stool might have stems either with small panicles or with none at all. The fact might be established that the conditions under which the seedlings are grown very largely determine their ultimate value. In animal husbandry work the feeder recognizes that gain or loss is largely determined by the care the young animal receives.

Since the soil used in the nursery seedling experiment is similar to that often used in rice seedling beds, the indication is that the ordinary soil needs an application of manure to insure thrifty plants.

An application of farm manure, preserved under shelter, applied at the rate of 1 cavan per 10 square meters, and worked with the soil, would insure sufficient plant food. Other conditions being normal, good results may be expected when the palay is either drilled in furrows about 10 centimeters apart and 3 centimeters deep or evenly broadcasted at a rate not to exceed 5,000 seeds per square meter—a rate which is equivalent to 1 ganta of seed of group B to every 28 square meters of seed bed or 1 cavan for 700 square meters. This rate requires a seed bed about as large as the usual one and three times the rate advocated by the Bureau of Agriculture.[8] It provides ample room for growth, and at transplanting time it is not difficult to remove the desired number of plants to be set in a hill. As this moderate rate of seeding reduces the demand for available food per given unit of area, the individual plants are more likely to be well supplied.

A great deal of practice is needed to become skilled in even and rapid sowing of seed by hand. The seed should be sown on smooth ground, counted, and resown until the required skill is

[8] One cavan of seed to $\frac{1}{40}$ hectare or 250 square meters.

attained. When rice is grown on a large scale, a hand seed-drill can be used to good advantage.

OPTIMUM DISTANCE FOR TRANSPLANTING AND OPTIMUM NUMBER OF PLANTS PER HILL

At the present time experimental evidence is not sufficient, at least in these Islands, to warrant a conclusive statement regarding either the proper transplanting distance for rice or the most desirable number of plants to set in a place. Experiments of this kind require a period of years to make them worthy of consideration. Table IV shows that there is a wide variation in the transplanting distances, all of which, with the possible exception of the two extreme distances, are found in ordinary use.

Therefore, in common practice, the area possible to transplant with the seedlings from 1 cavan of the ordinary-sized palay may vary from 0.3 hectare to 4 hectares, the smaller area being the most usual. The farmer should know what is considered the best practice.

The optimum distance for transplanting and the number of plants to use is a complicated problem, since there are many factors to be considered. A very fertile soil of fine texture tends to produce rank growth and hence requires fewer plants than does a more porous and less fertile soil. Rank-growing and copious-stooling varieties naturally require fewer plants per unit of area than similar varieties having little or no tendency to stool. As the growth of vegetation is greater during the rainy season when the air is saturated than during the dry season under irrigated conditions, a greater number of plants can be used under the latter conditions.

There is every reason to believe that overcrowding of plants results in poor yield. Overcrowding is a common practice in the Philippines (Plate V, fig. 2).

Setting plants in hills 10 by 10 centimeters with one plant to a hill, thus equally apportioning the soil and room for growth, would insure each plant favorable conditions for development and yield. This involves too much labor in separating and transplanting the plants, as the number of hills required for a given number of seedlings is from four to ten times as great as that required for the greater planting distances. As long as transplanting is done by hand, there will be more than one plant in a hill. At present a distance of from 15 to 25 centimeters between hills is considered most advantangeous. On this subject H. O. Jacobson, Bureau of Agriculture, states:

Basing our opinion on our experience we would say that too scanty spacing induces more weed growth which in turn becomes an item of expense in its control, therefore, with most varieties, spacing the hills not closer than 15 x 15 cm. nor more widely than 20 x 20 cm. will insure good results.

As to the optimum number of plants to a hill, we have arrived at certain conclusions which a study of the following tables will make self-evident:

TABLE IV.—*Showing the area required for transplanting the seedlings produced from 1 cavan of seed.*

Planting distance.	Plants per place.	Seedlings per hectare.	Area required to plant—		
			1,200,000 seedlings.	1,680,000 seedlings.	2,160,000 seedlings.
cm.			*sq. m.*	*sq. m.*	*sq. m.*
10 by 10	1	1,000,000	12,000	16,800	21,600
12.5 by 12.5	1	640,000	18,750	26,250	33,750
12.5 by 12.5	2	1,280,000	9,375	13,125	17,885
15 by 15	1	444,444	27,000	3,780	48,600
15 by 15	2	888,888	13,500	1,890	24,300
20 by 20	1	250,000	48,000	6,720	86,400
20 by 20	2	500,000	24,000	3,360	43,200
20 by 20	4	1,000,000	12,000	16,800	21,600
20 by 20	8	2,000,000	6,000	8,400	10,800
22.5 by 22.5	4	790,120	15,186	21,260	27,337
22.5 by 22.5	8	1,580,240	7,593	10,630	13,668
22.5 by 22.5	16	3,160,480	3,796	5,314	6,834
22.5 by 22.5	22	4,345,660	2,761	3,865	4,970
25 by 25	4	640,000	18,750	26,250	33,750
25 by 25	8	1,280,000	9,375	13,125	16,875
25 by 25	16	2,560,000	4,687	6,561	8,437
25 by 25	20	3,200,000	3,750	5,250	6,750
30 by 30	6	666,666	18,166	25,432	32,400
30 by 30	12	1,333,333	9,000	12,600	16,200
30 by 30	18	1,999,998	6,000	8,600	10,800

The three numbers of seedlings given in the column headings represent the quantities which may be produced from the three groups of seeds established in Table III.

From Table IV it is very evident that the area possible to transplant with the seedlings produced from 1 cavan of palay depends upon the transplanting distance, the number of plants per place, and the number of seedlings produced from a cavan.

The transplanting distances given represent nearly all possible variations. Given the transplanting distance and the desired number of seedlings per hill, then it is very easy with the aid of this table to calculate the approximate area required for any given number of seedlings. In actual practice the number of

plants set in a place need not greatly vary when the seedlings are carefully removed from a seed bed not thickly planted.

If the farmer considers a planting distance of 20 by 20 centimeters with four plants in a place as most desirable, then with the aid of the table it is easy to calculate the area required for a definite number of seedlings. One million six hundred eighty thousand, the number of seedlings produced from a cavan of seed of the average size, would transplant an area of 16,800 square meters with 1,000,000 seedlings per hectare.

TABLE V.—*Showing average plant productions.*

Plants per hectar.	Yield per plant when the yield in cavanes per hectare is—					
	10.	20.	30.	40.	50.	60.
	g.	*g.*	*g.*	*g.*	*g.*	*g.*
4,000,000	0.10	0.21	0.32	0.43	0.53	0.64
2,000,000	0.21	0.43	0.64	0.86	1.07	1.29
1,000,000	0.43	0.86	1.29	1.72	2.15	2.58
800,000	0.53	1.07	1.61	2.15	2.68	3.22
600,000	0.71	1.43	2.14	2.86	3.58	4.30

The average plant production varies with the number of plants per hectare. With 1,000,000 plants and a yield of 40 cavanes the average plant production is 1.72 grams. This is a low average plant yield, being equivalent to 70 grains of ordinary size—an amount which may easily be contained in a teaspoon.

In Laguna Province I found farmers using a transplanting distance of 22.5 by 22.5 centimeters with an average of 22 seedlings per place or about 4,000,000 plants per hectare.

TABLE VI.—*Showing actual average yields of selected plants of six varieties of rice grown under ordinary conditions.*

Variety.	Average weight of seed.	Average mature seeds per panicle.	Average panicles per stool.	Average seeds per stool.
	g.			
Laguilan	17.8	203	4.6	938
Caribud	12.9	108	3.8	419
Caluctot	16.8	85	8.0	680
Inintivo	18.4	118	6.0	708
Calibu	12.7	80	7.3	627
Mindanao	27.09	154	6.2	954

From Table VI it is evident that the best yields for individual plants vary for different varieties. The yields recorded are

very ordinary, but they show the possibilities of the rice plant. The number of plants which produce exceptional yields in any variety is small. Supposing it possible to increase the average production of the varieties as a result of proper planting and selection so as to approach the yields recorded in Table VI, the total yields would immediately be doubled or tripled.

TABLE VII.—*Showing potential possibilities of the rice plant.*[a]

[250,000 plants per hectare.]

Frequency of yield.[b]	Yield.		Frequency of yield.[b]	Yield.	
	Per plant.[c]	Per hectare.		Per plant.[c]	Per hectare.
	g.	*Cavanes.*		*g.*	*Cavanes.*
1	26.5	154	61	10.5	61
1	23.5	136	55	9.5	55
2	20.5	119	49	8.5	49
5	18.5	107	43	7.5	43
5	17.5	101	37	6.5	37
7	16.5	96	32	5.5	32
10	15.5	90	9	4.5	26
26	14.5	84	2	3.5	20
36	13.5	78	2	2.5	14
51	12.5	72	1	1.5	8
66	11.5	66			

[a] Jacobson, H. O., Phil. Agr. Rev. 7 (1914) 346 to 351, furnished the data from which the above table was formed.

[b] Under the column heading "Frequency of yield" the numbers represent cultures of 100 plants each grown on 4 square meters of ground.

[c] Based upon 100 plants grown on 4 square meters.

In the experiment from which the above results were obtained the rice plants were placed 20 by 20 centimeters apart, one in a place, ample room being provided for the optimum production of the individual plant. Nine varieties were used in the experiment.

From the point of frequency it will be noticed that 83 per cent of the cultures produced a yield which, calculated on the hectare basis, exceeded 40 cavanes per hectare and 54 per cent exceeded 60 cavanes per hectare.

A comparison of the average production of the plants recorded in Table V with the average production of plants given in Table VII warrants the statement that the practical possibilities of the rice plants are not obtained by the ordinary Filipino methods.

The exceptional yields obtained in the experimental plots given in Table VI when 250,000 plants were grown on a hectare, in contrast to from 2,000,000 to 4,000,000 plants, the usual num-

ber, seem to indicate that one of the principal factors governing poor yield is excessive planting.

One hectare may be planted with 1,290,000 seedlings when transplanted 8.8 by 8.8 centimeters apart with one plant in the hill. Under these conditions that number may not be considered excessive when compared with the same number transplanted 25 by 25 centimeters apart with eight plants to the hill. The number of seedlings per given unit of area remains the same, yet by the latter plan overcrowding is evident as the plants are spaced neither to use the ground economically, nor to provide sufficient room for growth. Thus it is very evident that the maximum number of seedlings per hectare requires the closest planting distance. More than four plants for a transplanting distance of 15 by 15 centimeters or more than six for a distance of 20 by 20 centimeters must be regarded as overcrowding. Three plants for the former distance and four for the latter are regarded as the optimum number of seedlings to a hill, a rate which would limit the number of seedlings used on a hectare to 1,000,000 for the lesser distance and 1,300,000 for the greater.

These results correspond very closely with those of the Bureau of Agriculture, which advocates from three to five seedlings per hill as the best number to insure maximum yields. H. O. Jacobson comments on this subject as follows:

> Denser plantings will surely not increase the yield, but, as to how dense a planting can be before it affects the yield adversely, I am not prepared to say. On the other hand much scantier spacing than indicated above will affect the yield but slightly if at all.
>
> It should be borne in mind that the rice plant is very adaptable in some respects, and that the limiting factors on yield are available plant food and water. If a plant is given much space it will draw upon available plant food to its utmost capacity; but where the plants are more closely crowded a number will not survive and the remaining ones compete with each other for the available plant food and water.
>
> Planting too closely should be condemned because it tends to prevent normal development of the plants, requires more labor in planting which is profitless and wastes seed.

The final hectare production depends upon the sum total of the yields of the individual rice plants. The data presented in Table V indicate that the average production of the individual plant is very poor when grown under the usual conditions. The data in Tables VI and VII point to the possibilities of rice when attention is given to the individual plant.

To secure the maximum yield of rice, proper attention to all the important factors is demanded—that is, selecting a va-

riety; seed selection within a variety; growing the seedling; transplanting at proper age; preparation of soil in the field and maintaining its fertility; and transplanting distance and number of seedlings per hill.

Continued experimentation is necessary before conclusive recommendations can be made concerning these various factors.

CATCH CROPS

Localities which have two distinct seasons, wet and dry, can grow but one crop of rice each year without irrigation. This crop is usually harvested at the end of the rainy season. On land where the water table is not more than a meter from the surface catch crops can get sufficient moisture to produce good paying results.

It is advisable to cultivate the paddies, as cultivation enables the soil to be well aired, encourages the growth of beneficial bacteria, and aids in the destruction of weeds. In China and Japan a vegetable crop often follows rice. The cost of the work of cultivation can be met in this way. Legumes such as peanut (*Arachis hypogaea*), mongo (*Phaseolus radiatus*), cowpea (*Vigna unguiculata*), and *sitao* (*Vigna sisquipedalis*) are advisable if the soil is deficient in nitrogen. They also form one of the cheapest substitutes for meat.

Any one of these crops, succeeding the rice crop or grown whenever failure due to locusts or drought cuts the time short for a rice crop, should increase the revenues of the farm and give variety to the farmer's diet.

UPLAND RICE

Rice is sometimes classified as upland or lowland. The first class includes the varieties which are accustomed to conditions favorable to corn or tobacco, while the latter class has reference to varieties accustomed to swampy or saturated soils. A third class may be given which would include the varieties which are interchangeable and which will grow under either conditions.

COMMONEST METHOD OF SOIL PREPARATION

The preparation of the soil is too often delayed until the light rains begin to fall, a short time before the real rainy season begins. The ground is plowed both ways once or twice. Leveling with the bamboo harrow often follows the second or third plowing. It is not uncommon, however, for the seeding to be done after the last plowing, the seed being covered at a subsequent harrowing.

The soil is stirred to a depth seldom exceeding 15 centimeters, its fineness depending upon the condition of the weather.

The ground planted to upland rice is used to a limited extent for tobacco, corn, and mongo or other legumes.

When land covered with cogon grass (*Imperata exaltata*) is required for rice culture, the grass is burned during the dry season, the ground being prepared in the usual manner not much in advance of the time for sowing.

SPECIAL METHOD OF SOIL PREPARATION

Caiñgin.—In general, rotation of crops is seldom practiced and no effort is made to maintain either the fertility or the productivity of the soil. Crop remains are either burned or permanently removed. When the soil fails to bring favorable returns, it is abandoned and new land is used. In this way the land rests about eight out of twelve years and is subjected to nature's method of rebuilding. Trees, brush, and cogon or other grasses growing on the soil are cut and burned and the rubbish is removed. Most of the stumps and roots are left in place. The soil is stirred to a depth of about 4 centimeters. The entire farming operations are done with crude tools.

TIME OF SOWING RICE

The optimum time for sowing rice necessarily varies in different regions according to the distribution of the rainfall. The crop must be sown at the most opportune time to insure its greatest growth during the excessive rains.

In Luzon most upland rice should be sown during the last of May and all of June.

METHODS OF SOWING

Broadcasting or scattering the seed by hand is the most usual method of sowing upland rice. The farmer carries a small amount of seed in a bag or basket. As he walks across the field he either tosses the grain before him or scatters it with a swinging motion of his arm and sows a swath from 2 to 4 meters in width as he goes. The seed cannot be uniformly sown, and the amount used per hectare varies between 1 and 3 cavanes.

The seed is covered by means of either a bamboo harrow or native plow. Seed sown on freshly plowed ground and covered in this way cannot be covered to a uniform depth.

Among the hill farmers, who use the caiñgin system of farming to a great extent, broadcasting is seldom practiced, as the ground is not in good enough tilth to permit it. The *bacal* or *sabug* is the commonest practice. It is here described as practiced in Laguna Province. A tool known as *pang bacal* is used to make

holes about 20 centimeters apart. The tool consists of a bamboo pole, about 3 meters long, with a sharpened iron point on one end. The other end is split into many parts, each one nicely rounded. This tool serves a double purpose when in use: the sharp iron-tipped end is plunged into the soil with a rebounding movement, thus making a line of holes; while the split part, making a rattling noise, furnishes a sort of music which lightens labor. Fifteen or twenty neighbors may assemble to help in the work of planting. They may line up side by side, each with a bamboo tool in his hand and the task of making holes begins. They manipulate these musical tools in very good time. Others follow with small bamboo tubes or baskets of palay and drop from 5 to 20 grains in each hill, while still others may follow along and cover the seed with their feet or with bamboo brushes.

The methods of raising upland rice are open to the following criticisms:

Preparation of soil is often very poor.
Rotation of crops is not well provided for, and crop residues and manures are wasted.
Distribution of seed is very uneven, and the amount used is excessive.
Methods of covering seed are faulty.

The preparation of a good seed bed is the first essential. The ground should be thoroughly worked to a depth of at least from 15 to 20 centimeters and the soil made very fine. Fine soil particles not only permit the fibrous roots to penetrate the soil readily, but favor the retention of the optimum amount of moisture. Land under continuous cultivation can be better and more readily prepared than cogon or grassland. When the work is delayed until a short time before sowing, the soil cannot be properly prepared. This is especially true of cogon or grassland. Due to a toxin secreted by cogon, and to the abundance of roots not decayed, grain crops do not grow well on this kind of land when it is newly prepared. Soil of this character can be put into excellent condition only when its preparation is begun at least six months or a year prior to sowing.

It is advisible first to cultivate a crop or two of cowpeas, soy beans, mongos, or peanuts upon this soil. They grow better than most crops, and when planted in rows, 60 centimeters or more apart, they can be cultivated or plowed easily. In this way the grass can be eradicated, the soil enriched to some extent, and the physical condition greatly improved—the result being an ideal seed bed for rice.

A continued rotation of rice with legumes will enable the farmer to prolong the productivity of his soil. All plant resi-

dues should be converted into manure and replaced on the soil. Manure should be thinly applied before sowing.

AMOUNT OF SEED TO SOW

The factors governing this question are practically the same as those controlling the optimum transplanting distance.

The plant growth is not as great for the upland varieties of rice as for the lowland, as a result of a great difference in the physical conditions of the soil and the amount of moisture present. For this reason more seed may be sown to advantage on the upland.

Experiments in the grain regions of the United States have shown that broadcasting is not as economical a practice as drilling the grain. The latter method requires the use of a machine which enables the farmer to govern the rate as well as the depth of sowing. Drilling requires less seed per hectare than broadcasting, and insures greater uniformity in stand, in growth, and in maturity of grain.

Under the present methods of sowing rice in the Islands great loss usually occurs. The seed is sown on the freshly plowed land and is covered by a bamboo harrow or by the native plow. Some is left exposed to the attacks of birds, and some is buried too deeply to germinate or is very slow in germinating. For these reasons broadcasting requires more seed in order to make allowance for the loss. The extra cost of drilling is often more than balanced by the increased yields and the economical use of seed.

There are small machines or drills on the market which can be worked with one animal; there are also larger ones, the operation of which requires two or three animals.

When broadcasting is the practice, the seed is more economically used when the bed is well prepared and leveled before sowing. Under these conditions the seed can be covered with the harrow.

As a results of experiments conducted by the Experiment Station, Berkeley, California, a rate of from 1.5 to 1.8 cavanes per hectare is recommended as the most effective rate of seeding when the seed is drilled. That amount gave better yields than a greater or a less amount of seed. That station also recognizes the fact that the type of seed should govern the rate of sowing.

The Bureau of Agriculture recommends the use of 1.5 cavanes per hectare when the seed is evenly scattered, but it asserts that drilling the seed instead of sowing it broadcast increases the return per hectare.

ILLUSTRATIONS

PLATE II

FIG. 1. Three varieties of rice, identical conditions. Extreme variation in productivity of progeny. (Cut loaned by the Bureau of Agriculture.)

2. The same varieties of rice as shown in fig. 1. Variation in productivity of progeny. (Cut loaned by the Bureau of Agriculture.)

PLATE III

Range in the shapes of kernels and grains of rice. (Cut loaned by the Bureau of Agriculture.)

PLATE IV

Extreme variation in productivity of progeny; two varieties of rice grown under identical conditions.

PLATE V

FIG. 1. Binicol rice. One hundred selected panicles on left and one hundred nonselected on right.

2. Too many seedlings in a place.

PLATE VI

FIGS. 1 and 2. Good stocky seedlings. The material was selected by the author from seedling experiment. (Photograph by F. C. Gates.)

Fig. 1. Three varieties of rice, identical conditions. Extreme variation in productivity of progeny.

Fig. 2. The same varieties of rice as shown in fig. 1. Variation in productivity of progeny.

PLATE II.

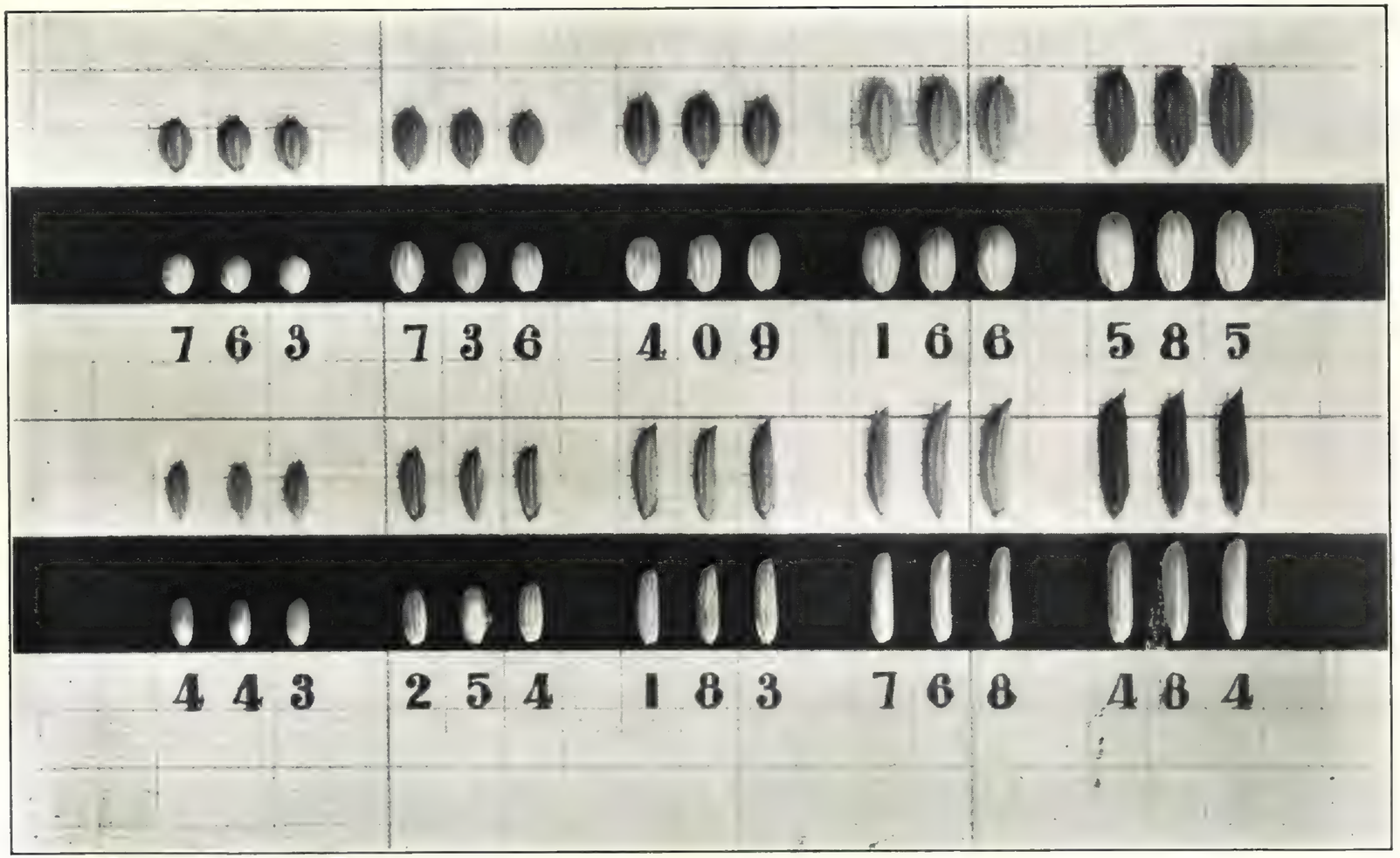

PLATE III. RANGE IN THE SHAPES OF KERNELS AND GRAINS OF RICE.

PLATE IV. EXTREME VARIATION IN PRODUCTIVITY OF PROGENY; TWO VARIETIES OF RICE GROWN UNDER IDENTICAL CONDITIONS.

Fig. 1. Binicol rice. One hundred selected panicles on left and 100 non-selected on right.

Fig. 2. Too many seedlings in a place.

PLATE V

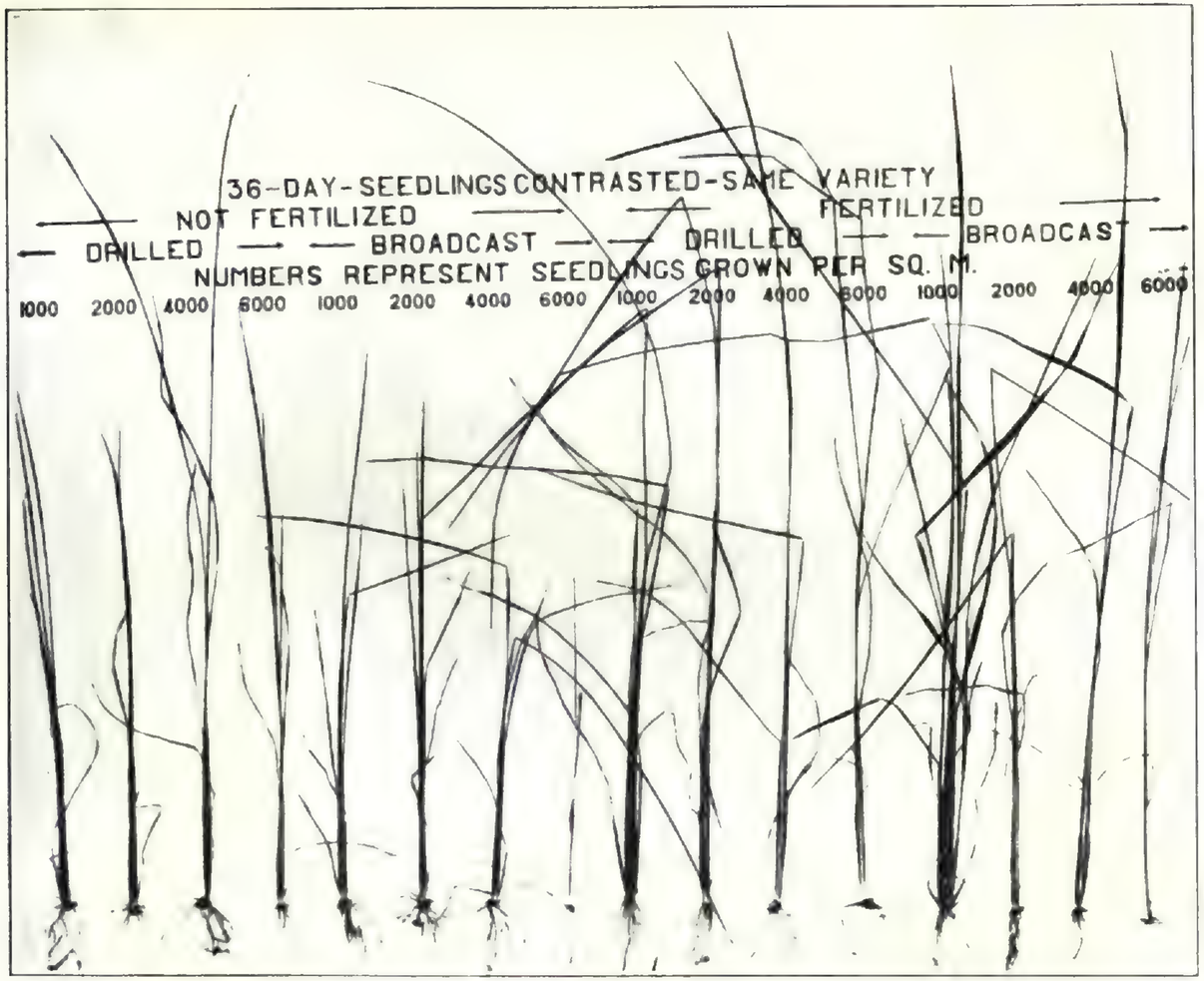

Fig. 1.

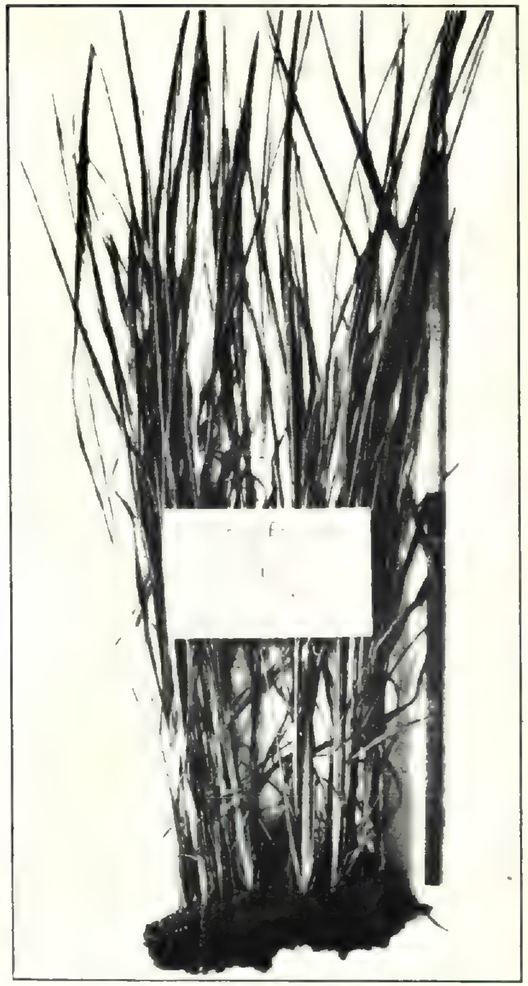

Fig. 2.

PLATE VI. GOOD STOCKY SEEDLINGS.

A PRELIMINARY STUDY OF PHILIPPINE BANANAS [1]

By NICANOR GREGORIO TEODORO
(*From the College of Agriculture, University of the Philippines*)

TWELVE PLATES

INTRODUCTION

Few of the numerous valuable varieties of fruits known to man are economical and satisfying articles of diet, and very few are available throughout the year. The banana, however, fulfills both of these requirements. Generally speaking, it is the only fruit which is plentiful at all seasons of the year. It is one of the most wholesome and appetizing of fruits. Because of these facts it is used alike by rich and poor throughout the tropics as well as in many parts of the temperate zones. The particular value of the banana in human diet seems to be to furnish succulent, nutritious, and easily digestible food. It is interesting to quote the remarks of a commissioner to the World's Columbian Exposition of 1893. He stated in part as follows:[2]

> The banana meal engaged the careful attention of several of the leading grocers in Chicago and elsewhere. One large house in Chicago, Sprague, Warner, & Co., after testing samples of this meal was so pleased with the results that it offered to undertake to introduce it as a food for infants and invalids * * *.

Beside the use of its fruits, it has many other uses. The stems of various sorts of *Musa* produce very valuable fibers, for example, that yielded by *Musa textilis* and known as Manila hemp. The stems of *Musa sapientum* are commonly used by the Filipinos as food for hogs and for half a dozen other purposes. The leaves are used as thatches for young seedlings, especially tobacco; for sheaths for packing bales of tobacco; and for wrappers for various sorts of articles of food.

Among the most interesting features of the banana which are worthy of note are the suitability of its suckers for transport over long distances without injury and its adaptability to

[1] Thesis presented for graduation from the College of Agriculture, University of the Philippines, No. 39.

[2] Species and principal varieties of Musa, Kew Bull., Add. ser. VI pt. 2 (1906) 84.

successful production in a great variety of soils and under widely varying conditions. The banana is extensively cultivated in the tropics. For family consumption it is usually planted on the boundaries of an inclosure or about dwelling houses. In many localities there are solid plantings of thousands of hectares which usually give good returns as an investment. The opening up of large plantations, together with more thorough utilization of the crop and a better knowledge of the capabilities of the leading varieties, would without question eventually develop an export trade in banana products from the Philippines. Of late years the demand for bananas has largely spread to temperate countries and an enormous trade has resulted.

There is a great lack of knowledge as to what varieties may best meet the several special purposes to which they may be adapted. In the present study an attempt has been made to begin this work for the Philippines. There are various marked characteristics of the flowers which will clearly separate one variety from another. There are also various textures and flavors of the ripe banana. Some are acidulous and others acid-sweet or neutral sweet like sugar. In some of the best varieties the pulp is soft and melting with various colors of flesh and has various delicate fruity flavors, which are adapted to different market demands. There are others with striking peculiarities which adapt them to certain special uses, such as the making of flour or of "banana figs." In spite of these facts the names of the varieties are in the greatest confusion, the same name frequently being applied to entirely distinct forms, while the same form is frequently known under many different names in different localities and countries. No systematic attempt has yet been made to bring order out of this confusion. In an agronomic group of such high importance as this, such a condition should no longer be tolerated.

As the banana has become recognized as a fruit of high value, because of its importance as food, and as a possible source of many manufactured products, such as "figs," flour, alcohol, etc., it is important to undertake thorough botanical studies of the several varieties. This is necessary in order to ascertain the botanical status of the varieties and races and to furnish students and planters with the correct names and accurate descriptions of all varieties under cultivation.

ORIGIN AND HISTORY

As far back as history reaches we know that banana root stocks and hearts were used as articles of food by many peoples.

It is possible that man first appeared in the original home of the banana. The editor of the Journal of Heredity says:[3]

> If man appeared in the Indo-Malayan region, as is widely believed at present, it seems natural to seek for the origin of the banana in the same region; and such a location for it is accepted by most botanists.

It is presumed, however, that the banana cultivated for its roots began to produce better fruits by chance, as a result of asexual propagation. Subsequently, better fruits in time gave a pulp agreeable to the taste. At any rate, the attention of primitive people was early attracted to the banana, and it was brought into extensive cultivation. It is probable that the banana was propagated from various seedless sports in times too remote for record, as the wild forms are commonly full of seeds. Following this the diffusion of the various more desirable varieties became so wide that attempts to determine the exact country which might be regarded as the original home of the different forms seems almost futile. Among botanists there is great divergence of opinion concerning this matter.

O. F. Cook[4] says that the wild bananas and their botanical relatives are natives of the rocky slopes of the moist tropics. As a matter of fact the banana can be grown in both tropical and subtropical regions, and lately it has been cultivated even within the borders of the temperate regions. Some writers believe Asia to be its original home, while others claim that it originated in America. The idea of southern Asia as the native home of the bananas was considered doubtful by Humboldt, since in his work on New Spain[5] he had learned from early authors that the banana was cultivated in America before the conquest. Humboldt's statement that "it is a constant tradition in Mexico and on the whole of the mainland that the *platano arton*, and the *dominico* were cultivated long before the Spanish conquest," was critically upheld by Hernandez, since it is believed by most botanists that tradition cannot be accepted as the only proof that America is the native home of the banana. History is said to be at fault in this matter, and we can only hope to be enlightened by the early discoverers, who were present in the different epochs in which American agriculture was enriched by foreign products. In this connection we can only refer to a

[3] Journ. Heredity 5 (1914) 273.

[4] Ann. Rep. Smithsonian Inst. Washington (1903) 481; fide, Journ. Heredity 5 (1914) 273.

[5] Humboldt, Nouvelle Espagne, 1st ed. 2: 360; fide De Candolle, Origin of Cult. Plants, 304.

Peruvian, Garcilaso de la Vega, who says that "at the time of the Incas, maize, quinoa, the potato, and in the warm and temperate regions bananas formed the staple food of the natives.[6]" To this we can add Humboldt's own observation that "on the banks of the Orinoco, of the Cassiquairi or of the Beni, between the mountains of Esmeralda and the banks of the river Caronoy, in the midst of the thickest forest, almost everywhere that Indian tribes are found, tribes which have had no relations with European settlements, we meet with plantations of Manioc and bananas."

The bananas which are presumably indigenous in America and which Humboldt and other writers observed and used to sustain their argument are probably those that were introduced into America in comparatively recent times. The editor of the Journal of Heredity[7] says: "Sixteenth century writers commonly call the fruit Apples of Paradise or Adam's Fig." The name banana gradually came into use in that century; it is the vernacular name given to the fruit by a tribe in the African Kongo. De Orta mentions it in 1563, while Hartwell[8] says: "Other fruits there are, termed Banana, which we verily think to be the Muses of Egypt and Syria." Thus the fruit, carrying with it the name which may have come all the way from its first station in the Indo-Malayan region, reached the Mediterranean and after the colonization of those islands—the Canaries. From the Grand Canary it was introduced to the New World in 1516, according to the very definite statement of Captain Gonzalo Fernandez de Oviedo y Valdes,[9] who heard the story "from many people." He ascribes the introduction to Hispaniola (Santo Domingo) to the "reverendo padre fray Thomas de Bernalanga, de la Orden de los Predicadores," "and from here," he continues, "it has spread to the other villages of the islands, and to all the other islands populated by Christians, and has been carried to the mainland; and in every region where it has been established, it has yielded excellent results."

It seems that there are reasons enough to consider that southeastern Asia is the native country of the banana, and that here will be found the most extensive development of varietal forms.

[6] De Candolle, Origin of Cult. Plants, 304.

[7] Journ. Heredity 5 (1914) 277–278.

[8] Pigafetta's Congo (1597) in Coll. Travels 2 (1746) 553; fide, Journ. Heredity 5 (1914) 277.

[9] Oviedo, Hist. Gen. y Nat. de las Indias 30 (1535) cap. I.

CLASSIFICATION OF THE BANANAS

The genus *Musa* belongs to the family Musaceae and embraces numerous species, some of which have many varieties and races.

Baker[10] considers that this genus comprises three subgenera, namely, *Physocaulis, Eumusa,* and *Rhodochlamys,* which he defines and describes as follows:

> 1. *Sub-genus Physocaulis (swollen-stemmed Musas).*—Stem bottle-shaped and usually not stoloniferous. Flowers many to a bract. Petal usually tricuspidate. Fruit not edible. In this group are all the species known to be indigenous to Africa, namely: *M. ventricosa, M. Bachanani, M. livingstoniana,* and *M. proboscidea.*
>
> 2. *Sub-genus Eumusa (true Musas).*—Stem cylindrical, gradually tapering from the base, usually stoloniferous. Flowers many to a bract. Petal ovate-acuminate. Bracts green, brown, or dull violet. Fruit usually edible. The species in this group divide naturally, according to their height, into dwarf-stemmed and tall-stemmed species. The dwarf are two Chinese species, *M. lasiocarpa* and *M. Cavendishii.* The tall are *M. sapientum* and its allies, about a dozen species in all. They are widely distributed throughout Eastern Asia, India to China, Japan, Borneo, New Guinea, North Queensland, and the Islands of the Pacific.
>
> 3. *Sub-genus Rhodochlamys (red-bracteated Musas).*—Stem cylindrical as in true Musas, usually stoloniferous. Flowers few to a bract. Petal linear. Fruit usually not edible. Bracts bright colored, often red. Twelve species are included here. One only (*M. maculata*) yields edible fruit. The others, such as *M. coccinea, M. rubra, M. velutina,* and *M. aurantiaca,* owing to their brightly coloured bracts, are very ornamental. All are from India, Assam, Sumatra, Java, and Cochin-China.

The subgenus *Eumusa* includes the important cultivated species, such as bananas and plantains. These two species are widely cultivated in the tropics; the bananas include very many varieties, which are badly confused. Their fruits when ripe can be eaten without cooking, except in a few cases. The plantains have coarser fruits, which are only agreeable to eat after being cooked.

A later discussion of the classification of the Musaceae is given by K. Schumann.[11] He adopts three sections of the genus. His arrangement of the series of distinct forms related to *paradisiaca* and *sapientum* I regard as of doubtful value. Here *sapientum* appears as a subspecies of *paradisiaca,* while another subspecies *seminifera* includes seeded forms, and a fourth is *troglodytarum* with erect inflorescence. It appears to me, that so far as cultivated musas are concerned, a monograph must be of little value

[10] Kew Bull., Add. ser. VI pt. 2 (1906) 10.
[11] Das Pflanzenreich 1 (1900) 1–45.

when the vast majority of apparently distinct varieties are still botanically unknown and when the named varieties, and even species, are so incompletely known and described that they are often totally unrecognizable among their very numerous unknown congeners. Undoubtedly some of the Philippine varieties will be found to be identical with Indo-Chinese, Amboinese, and other Malayan forms. But such reference made on the strength of any existing literature would be merely adding to the confusion already existing. For instance, there are all shades of red bananas occurring throughout the tropics, representing a whole series of well-marked varieties, apparently quite distinct in the structure of their flowers. As a basis for classifying these, Schumann's monograph furnishes us the following:

Var. *rubra* (Firminger). Bacca. 15 cm. longa obscure rubra, matura flavido-rubra; truncus, petiolus, medianus et flores obscure rubri, Ram-Kela Indorum.

Var. *violacea* Bak. Truncus et saepe folia subtus plus minusve violacea.

Var. *saguinea* Welw. ex Bak. Folia et bacca intense sanguinea.

These descriptions are so general as to be of no value for the critical distinction of varieties. There is nothing in literature that would make it possible to know if the variety *violacea* of Baker, 1893, is the same as the variety *violacea* of Blanco. The probability is that they are not at all the same. None of Blanco's numerous varieties are mentioned by K. Schumann.

DESCRIPTION OF SPECIES AND VARIETIES OF BANANAS

Since the time of Linnæus, who described *M. sapientum*, the banana, and *M. paradisiaca*, the plaintain, many species of bananas have been described by botanists. Due to lack of access to living plants or lack of good herbarium material these descriptions have very rarely been complete or clear, and this has rendered the group an extremely difficult one for study. Many of the descriptions are based on fruits alone, nothing being said of flower structure, which furnishes many characters of first importance. In connection with this work I have found that it is possible to make very good herbarium specimens which will represent leaves, bracts, and flowers. When these are accompanied by photographs and drawings, as should always be the case, then the study of varieties may proceed, and gradually a foundation be laid for the grouping of races into varieties and varieties into subspecies and species. Hundreds of varieties of bananas and plantains are now in cultivation throughout the tropics and wild forms are numerous. The specific origin of the cultivated varieties is unknown, and can only be guessed at after

thorough anatomical studies. Attempts to classify the species of *Musa* supposed to include the cultivated varieties, without this study of all the varieties, leads only to uncertainty and confusion. In fact no one to-day seems quite certain how to use the original names *sapientum* and *paradisiaca*, and their standing must remain purely nominal as species, until fuller studies are made. To make one a variety of the other is purely a matter of personal opinion. Since the matter of species of cultivated bananas is not of immediate importance nor possible of definition with our present knowledge, attention is focussed in this work on varieties, since it is only by this means that the bananas can ever be brought into order or understood. For temporary purposes I use the names *sapientum* and *paradisiaca* in the commonly accepted sense.

The only previous attempt at a botanical study of Philippine bananas was made by Blanco.[12] He wrongly uses the specific name *paradisiaca* for the ordinary types of sweet bananas and gives Latin names to the varieties, and these names must be considered in any attempt at botanical classification. Blanco states that there were at least 57 varieties known in the Philippines in 1837. Much more detailed attention than has been given to this subject is necessary before the varieties of Rumphius, Blanco, Hasskarl, Loureiro, and others can be brought together into one harmonious system. Blanco uses the specific name *trogloditarum* to include the variety *botoan*, the wild *saguing machin*, the abacá, and the *virgen*, which are probably four distinct species none of which is near *trogloditarum*, with erect inflorescence, and which Baker places as a variety of *sapientum*. I shall employ Blanco's varietal names until they are proved synonymous with extra-Philippine names. Some of Blanco's descriptions are easily recognizable, and others are fortunately represented by well-known Tagalog names, so that all of his names can be fixed with certainty, except in the one case of the colossal variety *ulnaris*, which he described from hearsay and which no one has seen since his time.

Barrett [13] mentions 159 numbers of Philippine bananas as occurring in the Bureau of Agriculture collections at Singalong. Many of the names used in this list are merely synonyms, being interchangeable in their application. I greatly regret not having had access to that collection in connection with this work.

Some of the cultivated bananas of the Philippines, notably

[12] Flora de Filipinas (1837) 239–250; ed. 2 (1845) 168 et seq.
[13] Phil. Agr. Rev. 6 (1913) 436.

the *pitogo* and the *botoan,* represent just as distinct species or forms as *cavendishii, banksii, fitzalani, discolor, basjoo, malaccensis,* or *flava,* accepted by Baker and others as representing good species, and logically some or all of the above should be reduced as varieties or Blanco's varieties should be given specific rank.

Synopsis of species of Musa known to occur in the Philippines.[14]

a^1. Stem not stoloniferous, but more or less swollen at base.

b^1. Bracts dark claret brown, seeds 2 cm in diam.; plant becoming 10 m or more high; leaves sometimes 6 m long and 1 m broad with a red midrib ..... **Musa ensete Gmel.**

b^2. Bracts green and persistent; seeds less than 0.25 cm in diam.; plant 3.5 to 4 m high; leaves 2 m long and about 30 cm broad with glaucous green midrib, the trunk heavily white-waxy.. **Musa glauca Roxb.**

a^2. Stem stoloniferous, not swollen at base.

c^1. Flowers few to a bract, the bracts bright red or tipped with yellow; spike small, dense, erect; height 1.5 m ..... **Musa coccinea Andr.**

c^2. Flowers numerous in a fascicle, the bracts not bright red; spike of great size and pendant; height 2 m or more.

d^1. Normally seminiferous species, with very small, fingerlike or slightly swollen inedible fruits, usually white or green bracts, which may be partially persistent, simple scales, and pistil in terminal flowers distinctly shorter than the stamens; trunks usually slender.

e^1. Scale more than three-fourths as long as perigonium, simply acute, without apical shoulders..... **Musa textilis Née.**

e^2. Scale rarely two-thirds as long as perigonium; usually less acute, but with distinct apical shoulders.

f^1. Bracts all freely deciduous; fruits subcylindric.

Musa errans (Blanco).

f^2. Bracts partially persistent; fruits subovate.

Musa errans var. botoan var. nov.

g^1. Free margins of perigonium broadly inflated and largely covering the scale; pistil more or less completely divided into three separate styles and stigmas; scale with a very broad scarious margin; fruit small, obovoid and long-pedicelled ..... **Musa humilis Perr.**

g^2. Free margins of perigonium straight or receding, never inflated; pistil not divided; scale with narrow scarious margin if any; fruit never obovoid in form.

h^1. Plant normal in size; petioles long, narrowly if at all margined, the leaf blades never crowded at the summit of the trunk.

i^1. Flesh sweet and edible uncooked; usually of medium and small size and yellow or red when ripe.

Musa sapientum L.

"It will be recognized that these synopses are provisional, merely based upon the local work as far as it has progressed. The *sapientum-paradisiaca-cavendishii* complex is separated along commonly accepted lines, whether its components really represent good specific groups or not.

*i*². Flesh not sweet, and requiring cooking; fruit usually very large and often few in a bunch, commonly green at maturity, evanescently yellow, quickly becoming black ..... **Musa paradisiaca** L.

*h*². Plant more or less dwarfed; petioles short and strongly margined, the leaf blades crowded at summit of trunk. **Musa cavendishii** Lamb.

MUSA ENSETE Gmel. Abyssinian banana.

The Abyssinian banana is a very conspicuous ornamental plant. It is in cultivation at the College of Agriculture, but our specmens have not yet reached large size. It is described by Baker[15] as follows:

*1. **Musa Ensete**, *Gmel.* Abyssinian Banana. Native name "Ensete." *Bot. Mag.*, t. 5223–4. North Gallery, No. 516. Whole plant 30–40 feet high. Stem swollen at the base, not stoloniferous. Leaves oblong acute, sometimes 20 feet long and 3 feet broad with a red midrib. Bracts densely imbricated 9 to 12 inches long, dark claret brown. Fruit coriaceous, dry, 2 to 3 inches long. Seeds 1–4 black, glossy, nearly an inch broad with a prominent raised border round the hilum. *Distribution:*—Mountains of Abyssinia to the hills of equatorial Africa; southward of Victoria Nyanza Lake. The largest known banana. * * *

This species is well adapted for subtropical countries, such as southern California, Florida, Algeria, and the Canary Islands and is often put out for the summer in London parks. When established in sheltered situations it is a very ornamental plant, having a noble and majestic habit. The fruit is useless for purposes of food. As the plant produces no offsets and perishes after fruiting it is propagated entirely from seed.

MUSA GLAUCA Roxb.

Musa trogloditarum dolioliformis Blanco.

This remarkable ornamental banana seems to be widely but very sparingly scattered through Luzon. It is undoubtedly native here. Merrill regards it as being undoubtedly *Musa glauca* of Roxburgh. A photograph of a specimen in the College of Agriculture grounds was presented in the Philippine Agricultural Review 6 (1913), No. 9, Plate I, where it is called "an unidentified wild species." The enlargement of the base of a stem is variable. The plant produces but a single trunk which dies at maturity. Blanco's description of this form is translated as follows:[16]

Stem slender at the base, a little farther above very thick, and then slender as in the other banana plants and the leaves and flowers similar.

[15] Bull. Kew Gardens, Add. ser. VI pt. 2 (1906) 12.
[16] Fl. Filip. ed. 2 (1845) 174.

Stamens five. Fruit angled, the seed large, hard, and similar in shape to the other species.

It is a very remarkable banana which was brought to me entire from Tanauan. The wise and industrious Sr. Azaola, who has helped me so much with his information in shaping this work, had already given me an account of this banana. It is known in the Province of Laguna and in Tanauan; and the most remarkable thing about it is its stem, which enlarges a little above the ground, assuming the shape of a common Philippine water jar, bigger than a human body. From this peculiarity I derived the name of the species. Furthermore, above this enlargement the stem becomes slender like other banana plants to which they are similar in leaves, flowers, racemes, and fruits. The seeds, however, are much larger, and the natives use them for making very ugly rosary beads. In the Province of Laguna they call this banana *Virgen*.

Baker's description follows:[17]

11. **M. glauca**, *Roxb.* Not stoloniferous. Trunk cylindrical, 10–12 feet high, 6–8 inches diameter. Leaves oblong-lanceolate, acute, 4–5 feet long pale and glaucous; shortly petioled. Spike drooping from the base; bracts greenish, persistent. Fruits oblong, 4–5 inches long, 1½ inches diameter; truncate at the apex, narrowed gradually to the sessile base. Seeds smooth, globose, nearly black, ½-inch diameter. Pegu; introduced to the Calcutta Botanical Garden by Mr. F. Carey in 1810. This has flowers like *M. superba*, and a cylindrical trunk like *M. sapientum*. Roxburgh in his *Coromandel Plants*, iii. 96, adds, "Like my *M. superba* it never produces suckers, consequently it must be reared from seed, which it furnishes in great abundance; the fruit containing little else, even fit for a monkey to eat."

MUSA COCCINEA Andr. Red-flowered banana.

The red-flowered banana is an ornamental plant. The species is described by Baker as follows:[18]

*30. **M. coccinea**, *Andr. Bot. Rep.* t. 47; *Bot. Mag.* t. 1559; North Gallery, No. 696. Stem stoloniferous, slender, finally 4–5 feet high. Rachis erect. Spike dense, erect; bracts bright red or tipped with yellow. Fruit oblong-trigonous, not edible. Seeds very small. *Distribution:*—Southern China and Cochin China. In the latter country it is called *Chuoi tau*. Introduced into cultivation in 1791 and now widely spread. Specimens of fibre prepared from this species are in the Kew Museum from Jamaica, prepared by Nathaniel Wilson, and also from Mauritius.

Occasional in Philippine gardens.

MUSA TEXTILIS Née. Manila hemp, abacá. Plate XVIII, figs. 6–10.

Musa abaca Perr.
Musa mindanaensis Rumph.
Musa trogloditarum textoria Blanco.

Stoloniferous from the base, producing from 10 to 15 flowering stems in a stool. Trunk cylindric, usually green, measuring

[17] Kew Bull., Add. ser. VI pt. 2 (1906) 17.
[18] Kew Bull., Add. ser. VI pt. 2 (1906) 30.

from 10 to 13 cm in diameter at the base and reaching a height of from 3 to 6 m.

The leaves are narrow-oblong, bright above and less glaucous beneath, firm in texture, often tinted with violet or white, deltoid at the base and round or acute at the apex. The length of a mature blade is from 162 to 200 cm and the width from 25 to 30 cm, the petiole measuring from 60 to 70 cm and slightly scalloped in cross section.

The inflorescence is a small drooping spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The basal bract or spathe is small and lanceolate, and as in other musas, does not generally produce flowers in its axil. It is dull brown inside, slightly shaded with pink and is smooth and green outside. It measures from 30 to 35 cm in length and from 10 to 12 cm in width. It is firm and leathery in texture.

The flowers are arranged in dense two-rowed fascicles, in three-ranked spirals. The flowers are small, measuring from 3 to 4 cm in length and from 0.7 to 0.8 cm in width. From 9 to 10 fertile flowers occur in a fascicle and from 3 to 6 hands in an inflorescence. Perigonium long-tubular, divided to the base on one side, 5-toothed at the apex, the lobes usually decurved. Scale white, not scarious-margined, obovate with an acute tip; it is either two-thirds as long or often nearly as long as the perigonium. The stamens of the terminal flowers are never aborted. The perfect stamens are longer than the pistil; the filaments are usually shorter than the anthers. The stigma is oblong.

The fruits are oblong, trigonous, very small, from 5 to 7 cm long, from 2 to 2.5 cm thick, narrowed to the apex, pedicel short. The position of the hands on the rachis is loose in arrangement, the fruits diverging from each other and standing at more or less nearly right angles to the rachis. They have a thick skin; the pulp is white and translucent when ripe. The ripe fruit is green. Seeds are abundant and turbinate.

This species is noted throughout the world for the valuable fiber produced by the leaf sheaths. It is universally known in commerce as Manila hemp, and the plant is called abacá in the Philippines. The fiber obtained from abacá is chiefly used for the manufacture of rope; the inferior grades of the fiber take an important place as one of the finest materials for paper making.

Many very distinct varieties of this species, which are as badly in need of careful botanical study as are the bananas, occur in the Philippines.

MUSA ERRANS (Blanco). Saguing machin. Plate XVII, figs. 6–8.

Musa trogloditarum errans Blanco.

Stoloniferous from the base, producing 23 or more flowering stems in a stool, reaching a height of from 4 to 5 m and a diameter of from 26 to 27 cm at the base. The trunk is rather slenderly cylindric, usually deep green.

The leaves are large, broad, elongate-elliptic, deep green above and glaucous below, rounded at the base and subtruncate at the apex, the mature blades measuring about 230 cm in length and 65 cm in width. Petioles deeply scalloped in cross section and from 56 to 60 cm in length.

The inflorescence is a huge pendant spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The spike usually bears 16 hands of matured fruits. The spathe is elongate-lanceolate, about 55 cm long, pale green, longitudinally pitted inside and smooth outside. The sterile bracts are also pale green and usually curl after falling.

The flowers (Plate XI, figs. 6–8) are small and white, arranged in dense, 2-rowed fascicles, in 3-ranked spirals, usually 18 in a fascicle. The perigonium is tubular, widened toward the apex with sinuses, shallow, 5-toothed. Scale nearly oblong, seldom with an acute, short tip, the surface much rounded, half as long as the perigonium; stamens longer than pistil and perigonium; the stigma is oblong. Flowers, beyond from 10 to 16 basal fascicles, sterile, the sterile deciduous flowers maturing gradually, the basal at about the same time as the lowest fertile flowers.

This wild species of banana, common in the forests of Luzon, was erroneously placed by Blanco as a variety of *trogloditarum*, the latter having an erect inflorescence and not known to occur in the Philippines. Blanco's description is translated as follows:[19]

> Each bract covers something like twenty small flowers. Corolla: The superior lip with five slender lobes, the two alternate ones smaller; the inferior much smaller, with small teeth somewhat noticeable in the upper part and without a depression on the exterior part of the base; there is no rudiment of the sixth filament. Fruit with three or even five ribs and full of perfect seeds. This rare banana springs up spontaneously in the woods. Its height and appearance are like those of the other varieties. The spadix is almost six feet in length and the bract of the spathe is green and not of other colors. The fruits are not much bigger than the middle finger. They cannot be eaten even when ripe, for they are bitter. They are full of black seeds when mature. From a single raceme this

[19] Fl. Filip. ed. 2 (1845) 172.

banana can be easily propagated throughout a province. Perhaps it is advisable to propagate it for the reason that its fibers appear to me to be of greater strength than those of the abacá, to which it is similar, and perhaps the former has given rise to the latter already cultivated and with an edible fruit. The habitat of the banana I am considering is in the mountains of Tala [i e., near the boundary between the Provinces of Rizal and Bulacan, Luzon].

T., saguing machin, saguing na ligao.

The *agotay* of Albay may belong to this species.

MUSA ERRANS var. **BOTOAN** var. nov. T., butuhan, botoan. Plate VII, figs. 5–10.

Stoloniferous from the base, producing from 4 to 8 flowering stems in a stool. Mature plant reaching a height of from 365 to 385 cm and a diameter of from 17 to 20 cm at the base. The trunk is cylindric, usually smooth and deep green.

The leaves are elongate-elliptic, deep green throughout, usually thick, strong in texture, preferably used by the Filipinos for wrapping purposes, rounded at the base and subtruncate at the apex, mature blades measuring about 180 cm in length and 50 cm in width. Petioles deeply scalloped in cross section, from 60 to 65 cm in length.

The inflorescence is a huge pendant spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The basal bract is oblong-lanceolate, light green inside and green outside. Bracts usually persistent. The time from sprouting to flowering is usually fifteen months or even longer.

The flowers (Plate VII, figs. 6, 7, and 10) are arranged in dense 2-rowed fascicles, in 3-ranked spirals. The size of the flowers varies; they are commonly from 6 to 6.5 cm long and from 1 to 1.5 cm wide. On some forms the flowers are slightly purple, while in some the scale is white and the perigonium yellowish green. The scale is oblong with a short, acute tip.

The fruits vary in size, but are fairly uniform in shape, often presenting sharp angles. They are usually ovate in outline. Some of the fruits are commonly smaller than the rest in the bunch. The hands on the rachis are closely packed together at variable angles. The skin is yellow and medium in thickness. The pulp is white and somewhat insipid or sour in taste when ripe. Seeds present. Only used as a medicine, for instance, in cases of dysentery.

Later it will probably be possible to distinguish several forms in this species, which occurs both wild and cultivated in the Philippines. The Visayan name of the *botoan* is said to be *lisohan*.

Blanco's description of this form is translated as follows:[20]

Flowers: Each scale of the spathe covers in the neighborhood of twenty small flowers. Corolla like that of the variety *ternatensis*. Stamens and anthers the same as in the variety *compressa*. Fruit resembling the *ternate* and full of round seeds, very depressed and with navel. This banana plant is very common and spontaneous in some woods, producing perfect seeds; hence its name. The fruit, which is of ordinary size, is used for making vinegar. It is also edible and is delicious. A buffalo exclusively fed for some months on the trunk of this banana without any other food lost all his teeth, in spite of the fact that the animal was very young, which is of course very remarkable. Drinking the water gathered from the base of the cut stem is generally believed to cure the contraction of man's sexual organ.

T., botohan, botoan.

Although placed by Blanco under *Musa troglodytarum*, this variety possesses little in common with that species.

MUSA HUMILIS Perr. T., pitogo. Plate XVIII, figs. 1–5.

Stoloniferous from the base, producing from 9 to 12 flowering stems in a stool. The trunk is cylindric, yellowish green in color, and reaches a height of from 330 to 390 cm and a diameter of from 19 to 23 cm at the base.

The leaves are elongate-elliptic, usually roundly entire at the base and subtruncate at the apex, deep green and shiny on the upper surface and glaucous beneath. The matured blades measure 220 cm in length and from 64 to 67 in width. The petioles are from 55 to 60 cm long, scalloped in cross section.

The inflorescence in a huge, pendant spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The spathe is large, elongate-lanceolate, from 60 to 63 cm long, longitudinally pitted inside, green and glaucous outside. The time from sprouting to flowering varies from eight to twelve months.

The flowers (Plate XVIII, figs. 2 and 4) are arranged in dense 2-rowed fascicles, in 3-ranked spirals, and are of medium size, from 7 to 7.5 cm long and from 1 to 1.5 cm wide. The peduncle and perigonium are brownish yellow. The perigonium is tubular, with thin, widely rounded, inflated margin. Scale oblong, white, with a thin wide margin and long acuminate tip; the margin is usually shallowly divided on the right side; strongly rounded on the surface. Stamens generally diverging, longer than perigonium and pistil; the pistil is split into three short branches with club-shape stigmas. Like *M. sapientum* the flowers beyond the 3 to 10 basal fascicles are sterile, the sterile deciduous flowers

[20] Fl. Filip. ed. 2 (1845) 172.

maturing gradually, the basal at about the same time as the basal fertile fllowers below.

The fruits (Plate XVIII, figs. 1 and 5) are small, green when unripe, obovoid in shape, with long pedicels, arranged closely and packed together around the rachis, from 8 to 9 cm long and from 4 to 5 cm in diameter. The skin is thin, the pulp is reddish yellow when ripe, firm and sweet, and very palatable when made into "figs."

This species, originally described from Mindanao material, is apparently no more worthy of specific rank than are many of the varieties enumerated below under *Musa sapientum*. It is one of the edible cultivated bananas with a very characteristic fruit.

Enetlog is said to be another name for the *pitogo*.

MUSA SAPIENTUM Linn.

Stoloniferous from the base, producing from 4 to 14 flowering stems in a stool. Trunk cylindric, usually green, measuring from 12 to 35 cm in diameter at the base and reaching a height of from 2 to 5 m.

The leaves are elongate-elliptic, shiny on the upper surface, and in some varieties waxy below, usually thin and roundly entire at the base and apex. The length of a mature blade is from 200 to 270 cm, and the width is from 50 to 80 cm; in some varieties purplish; petiole measuring from 35 to 78 cm and scalloped in cross section, purplish in some varieties.

The inflorescence is a huge pendant spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The basal bract or spathe is large and elongate-lanceolate or oblong-lanceolate and does not generally bear flowers in its axil. It is either red or green inside. It measures from 40 to 65 cm in length and from 17 to 20 cm in width. The time of flowering varies in the several varieties, some producing flowers within ten months and some after twelve months or even longer.

The flowers are arranged in dense, 2-rowed fascicles, in 3-ranked spirals. The size of the flowers varies in different varieties, from 5 to 9 cm long and from 1 to 2 cm wide, from 8 to 20 fertile flowers occurring in a fascicle and from 3 to 12 or more fascicles in an inflorescence. Perigonium long-tubular or somewhat spreading, divided to the base on one side, 5-toothed at the apex, the lobes finally decurved. Scale thin, often scarious-margined, ovate, usually about half as long as the perigonium; in some varieties it is white and in some pink or purple; the tip is often acute and deep-shouldered or not. Flowers,

beyond the 3 to 10 basal fascicles, sterile, the sterile deciduous flowers maturing gradually, the basal at about the same time as the lowest fertile flowers. The stamens of the terminal flowers in some varieties are either all or part aborted or sterile. The perfect stamens are usually longer than the pistil, the filaments usually longer than the anthers. The form of stigma varies, some being short and lobed and others oblong.

The fruits exhibit different forms and sizes in different varieties, cylindric or angular, elongated or short, from 6 to 20 cm long, from 2.5 to 7 cm in diameter, forming from 3 to 12 hands in a bunch, with from 6 to 19 fruits in a hand. The position of the hands on the rachis varies a great deal; some are in loose open order, and others are closely packed together at nearly right angles. Some fruits have a thick skin and others have a thin skin, some have a firm and others have a soft pulp. The fruits are either sessile or short-pedicelled, yellow or purple when ripe, the pulp yellowish or white when ripe; seeds usually absent.

Like other members of the genus, *Musa sapientum* yields a fiber, but it is inferior in tensile strength to that of *M. textilis*. The fruits are sweet and commonly eaten without cooking.

This species is grown in all tropical countries. It was originally described by Linnæus from cultivated and seedless forms.[21] It is practically unknown in a really wild state.

The above description is made from our own collections and would require much modification in a broader application.

Baker's description is as follows:[22]

> *23. **M. sapientum**, *Linn, Sp. Plant.* 1477; *Trew, Ehret.* t. 21–22. Stem cylindrical, usually green, reaching a height of 20–25 feet, 4–10 inches diameter, stoloniferous from the base. Leaves oblong, thin, bright green, 5–8 feet long, 1½ to 2 feet broad, usually rounded at the base; petiole 1–1½ feet long. Spike drooping, often 4–5 feet long; male flowers deciduous; bracts lanceolate or oblong-lanceolate, dull violet, more or less glaucous outside, the lower 1–1½ feet long, the upper ½ foot, often red inside, several expanded at once, the edges of the upper not involute. Flowers about a dozen to a cluster, yellowish white, 1½ inches long; calyx five-toothed at the top; petal ovate, half as long as the calyx. Fruit oblong-trigonous, 3–8 inches long, 1½ to 2 inches diameter, forming three to nine bundles of about a dozen each, rounded to the apex, narrowed gradually to the sessile base, yellow or bright yellow or reddish when ripe, the flesh fit to eat without cooking. Common banana. Universally cultivated throughout the tropical zone of both hemispheres for the sake of its fruit. It also yields a fibre, which, however, is much inferior in tenacity to that of *M. textilis*.

[21] Kew Bull., Add. ser. VI pt. 2 (1906) 28.
[22] Kew Bull., Add. ser. VI pt. 2 (1906) 22.

One of the original forms of this may be the wild *M. sapientum* mentioned by Roxburgh [23] as grown from seed received from Chittagong.

PHILIPPINE VARIETIES OF MUSA SAPIENTUM

Synopsis of Philippine varieties of Musa sapientum.[24]

a^1. Fruit usually subcylindric or oblong, the angles becoming reduced at maturity; never with seeds; flesh mealy or creamy, nonfilamentous, and usually without an evident core; plant medium to small. Section I.

b^1. Pistil distinctly exceeding the stamens, the latter distinctly shorter than perigonium; scale with a distinct angular terminal shoulder; fruits, 3.5 to 4.5 by 10 to 12 cm; pulp white.

c^1. Stamens far exceeding scale; surface of scale with strong longitudinal depressions and terminal transverse rugæ, the apicula very large; fruit long-pedicelled..... cinerea (Blanco). *Letondal.*

c^2. Stamens usually but little exceeding scale; surface of scale smooth, without strong depressions or transverse rugæ, the apicula small; fruit about 4 by 10 cm, sessile, with persistent style.

cubensis var. nov. *Manzana.*

b^2. Pistil the same length as the stamens or nearly so.

c^1. Fruit usually broadly sessile, reddish to purplish, 5 to 6 by 10 to 14 cm, the flower scar very large, with very thick skin, pulp cream-colored; scale with long apicula, angled shoulders, terminal rugæ, broad scarious margin, and a series of depressions on surface; leaves with purplish midribs.

violacea (Blanco). *Morado.*

c^2. Fruit long or short-pedicelled, the flower scar very small; scale not as above.

d^1. Stamens and pistil distinctly longer than perigonium; fruit reddish, with flower parts persistent.

americana var. nov. Cuban red, *morado de Cuba.*

d^2. Stamens and pistil about as long as perigonium, fruit with deciduous flower parts.

e^1. Fruit short-pedicelled, tip well filled, not narrowed.

f^1. Scale without terminal rugæ; fruit larger than in the *morado* and only slightly purplish; skin very thick; pulp cream-colored..... glaberrima (Blanco). *Durogo, dinuguan.*

f^2. Scale with strong terminal rugæ; fruit 3 to 4 by 14 to 16 cm, green, pulp cream-colored.

suaveolens (Blanco). *Bonǧolan.*

e^2. Fruit long-pedicelled, tip distinctly narrowed, 5 to 7 by 18 to 20 cm, yellow; scale purple with large apicula, but no shoulders, broadly scarious-margined.

[23] Corom. Pt. t. 275.

[24] The flowers used are the basal nonfruiting flowers of the terminal ("heart") portion of the spike. The fertile flowers are different and should be studied separately. The former are used because they are much more readily obtainable. This synopsis is merely provisional and should be used only as a general guide to the position of varieties. Varieties should be finally determined by detailed comparison with full descriptions.

f^1. Unripe fruit opaque green..... **binutig** var. nov. *Binutig.*
f^2. Unripe fruit whitish glaucous.
garangao var. nov. *Garangao.*

b^2. Pistil distinctly shorter than the stamens.
c^1. Pistil more than twice the length of scale; scale simple, without well-marked apicula; fruit nearly sessile, with long contracted tip and large flower scar, 3 to 4 by 15 to 16 cm, skin thick, pulp cream-colored..... **tudlong** var. nov. *Tudlong dato.*
c^2. Pistil less than twice the length of scale; scale always with well-marked apicula and rugæ or depressions.
d^1. Fruit with distinctly contracted tip; scale without terminal shoulders.
e^1. Scale with deep terminal rugæ; fruit short-pedicelled, and with persistent flower parts; scale without broad scarious margins.
f^1. Fruit small and short, 2.5 to 3.5 by 7 to 10 cm, very thin-skinned, and with very narrow contracted tip.
glauca (Blanco). *Veinte cohol.*
f^2. Fruit larger, about 3 by 13 cm, thick-skinned, and with a long and broad contracted tip; pulp reddish yellow.
daryao var. nov. *Daryao.*
e^2. Scale without deep terminal rugæ; fruit longer pedicelled, with deciduous flower parts; scale with broad scarious margin, suddenly broadened below; pulp yellow.
ternatensis (Blanco). *Ternate, gloria.*
d^2. Fruit with the tip filled, not distinctly contracted; scale more or less prominently shouldered.
e^1. Fruit long subcylindric, 3 to 4 by 12 to 16 cm; scale strongly and suddenly inflated above, pulp yellow.
lacatan (Blanco). *Lacatan.*
e^2. Fruit short, oblong-ovate.
f^1. Scale with broad, abruptly separated scarious margin and two discal impressions; fruit with flower parts deciduous, skin thick but fragile; pulp yellow.
canara var. nov. *Canara.*
f^2. Scale without distinct scarious margins, and with a single discal impression; fruit with flower parts persistent.
g^1. Scale with strong terminal rugæ; fruit with thin skin, 3 to 4 by 6 to 7 cm..... **inarnibal** var. nov. *Inarnibal.*
g^2. Scale without strong terminal rugæ; fruit with thick skin and a little larger than in *inarnibal;* pulp cream-colored.
tuldoc var. nov. *Tuldoc.*

a^2. Fruit strongly angled at maturity with sides strongly flattened, oblong-oval, long-pedicelled, tip narrowed, commonly with a few seeds, with flesh characteristically spongy and filamentous, and usually with a more or less well-defined core; pistil exceeding stamens; scale strongly inflated. Section II.
b^1. Scale not broadened in the apical two-thirds; apicula small, simple.
compressa (Blanco). *Saba.*
b^2. Scale suddenly broadened in the apical two-thirds; apicula very large, deeply furrowed and hooded..... **grandis** var. nov. *Sabang Iloco.*

MUSA SAPIENTUM L. var. **CINEREA** (Blanco). Latundan, tordan, letondal. Plate XIII, figs. 1–5.

Musa paradisiaca cinerea Blanco.

Produces from 5 to 10 flowering stems in a stool, characterized by the light green skin of the trunk, often covered with black or brown blotches; mature plant reaching a height of from 300 to 360 cm and a diameter of from 20 to 24 cm at the base.

The leaves are green throughout; the mature blades are from 238 to 263 cm long and from 71 to 74 cm wide, with petioles 72 to 75 cm long.

The spike bears from 4 to 10 hands of matured fruits. The time from sprouting to flowering is usually from eight to ten months.

The flowers (Plate XIII, figs. 1, 2, and 4) are white, large, from 7 to 9 cm long and from 1 to 1.5 cm wide; the perigonium with shallow sinuses; the scale white, obovate in shape, abruptly acute at the tip, deep-shouldered and deeply depressed on the surface, nearly half as long as the perigonium; stamens shorter than pistil; the stigma with oblong lobes.

The fruits are cylindrical, from 10 to 12 cm in length and from 3.5 to 4.5 cm in diameter when ripe, with white soft pulp and yellow skin. A common banana. The average weight of matured fruit is 71.2 grams; often the weight runs below this because of the condition of the soil.

Blanco's description of this variety is translated as follows:[25]

> The fruit has a thin skin, without notable angles, and is whitish. It is of the same size as the *ternate;* its flesh is delicate and of a grayish color. However, its taste is not superior to that of the other bananas. It is a pity that on its account the natives have abandoned the other species which are much better; its fruits are the only ones whose skin spilts and breaks. Years ago it was brought from India to Manila by Mr. Letondal, a French clergyman. I have found perfect seeds in this banana several times. I have also seen twin fruits covered with only one skin, two flowers acting together for its formation, as I have said happens with the scandent coffee. Letondal.

The names *latundan* and *tordan* are merely variations of the original name *letondal,* which is now little used. *Litondon, retundol,* and *tundan* are also used.

MUSA SAPIENTUM L. var. **CUBENSIS** var. nov. Apple banana, manzana de Cuba. Plate XI, figs. 6–10.

This variety was introduced at Los Baños from Cuba, through the United States Departament of Agriculture, and in the

[25] Fl. Filip. ed. 2 (1845) 175.

characters of the stem and fruits it bears a close resemblance to the variety commonly grown here under the name of *letondal* or *latundan*.

They differ only in that the terminal flowers of this variety often have aborted stamens; scale oblong, deep-shouldered, with a shorter acute tip and not deeply depressed on the surface.

The fruits are oblong in shape and slightly curved, angled by depression; pedicels very short, or fruit nearly sessile. Style persistent. The matured fruit is 10 cm in length and 4 cm in width; skin yellow and pulp white when ripe; average weight, 76.6 grams.

MUSA SAPIENTUM L. var. **AMERICANA** var. nov. Cuban red. Plate VII, figs. 6–10.

From 3 to 5 flowering stems in a stool; height of plant from 235 to 245 cm, diameter at base, 17 to 18 cm; trunk green with black blotches.

The leaves are green with light purple midribs and margins, smooth above and glaucous below; the mature blades 190 cm long and from 70 to 75 cm wide; petioles also slightly shaded with purple below, from 50 to 55 cm in length.

The spike bears from 3 to 5 hands of matured fruits. The spathe is about 50 cm in length and about 15 cm in width, red and longitudinally pitted inside, purple outside and more or less glaucous.

The flowers (Plate XIII, figs. 6, 7, and 9) are white, usually 12 or 13 in a fascicle, about 7.3 cm long and 1 cm wide; the perigonium narrow with shallow sinuses; the scale is obovate with narrow, thin margin and acute tip, much rounded on the surface, nearly half as long as the perigonium. Stamens and pistil distinctly longer than perigonium; the stigma has oblong lobes.

The fruits are nearly oblong, from 10 to 11 cm long and from 3 to 3.5 cm in diameter, slightly angled by depression, flower parts persistent; the pulp is soft and white when ripe, like letondal. The average weight of matured fruit is 69.92 grams.

MUSA SAPIENTUM L. var. **VIOLACEA** (Blanco). Morado. Plate V, figs. 6–10.

Musa paradisiaca violacea Blanco.

Height, 320 to 340 cm; diameter at base, 19 to 23 cm; from 8 to 12 stalks, the epidermis with occasional, black patches.

The leaves are green with purple midribs and margins, smooth

above and glaucous below; the matured blades from 215 to 260 cm long and from 74 to 80 cm wide; the petioles purple, 57 to 75 cm in length.

The spike bears 3 to several hands of matured fruits.

The flowers (Plate XV, figs. 6, 7, and 8) are large, from 6 to 6.5 cm long and from 1 to 1.4 cm wide; the perigonium is partly shaded with purplish toward the base, sinuses shallow; the scale is white, scarious-margined, deeply depressed on the surface, acute at tip, nearly ovate; stamens as long as perigonium or pistil; stigma oblong-lobed. Fruits from 10 to 14 cm long, from 5 to 6 cm in diameter; skin thick, purple or red; pulp fine and soft, cream-colored, and with a strong, banana flavor. Average weight of a mature fruit, 61.12 grams.

Blanco's description of this species is as follows:[26]

> The fruit is almost round, as thick as the wrist and has the length of a good *ternate* banana. The taste is similar, and I believe that the *ternate* does not have any advantage over it. This banana is recently known in Manila, and I do not know from where it has come.

MUSA SAPIENTUM L. var. **GLABERRIMA** (Blanco). Durogo. Plate XV, figs. 1–5.

Musa paradisiaca glaberrima Blanco.

This variety resembles the *morado* and differs from the latter only in a few respects, particularly in the flowers. The scale is rounded on the surface without thin scarious margin, but possesses a long, narrow, acute tip like that the *morado*.

The fruits are larger than in the *morado* and are only partly shaded with purplish. The spike usually bears 4 or more hands of matured fruits. The skin is thicker, and the pulp, like that of the *morado,* is sweet, fine, soft, of a cream color, and of strong banana flavor. The average weight of the mature fruit is 70.64 grams.

A translation of Blanco's discription follows: [27]

> The fruit is as long as that of the saba, slender, angular, slightly dark pink, and very smooth; it is not very delicious.
>
> T., galamay señora, dinuguan.

There is an error on Blanco's part in the inclusion of *galamay señora,* and the variety *glaberrima* must be used as applying only to *dinuguan.* The Tagalog name *durogo* is synonymous with *dinuguan. Galamay señora* is a different variety.

[26] Fl. Filip. ed. 2 (1845) 171.
[27] Fl. Filip. ed. 2 (1845) 171.

MUSA SAPIENTUM L. var. **SUAVEOLENS** (Blanco). Boñgolan, buñgulan. Plate XIV, figs. 6–10.

Musa paradisiaca suaveolens Blanco.

Plant reaches a height of from 280 to 290 cm and has a diameter of from 15 to 16.5 cm at the base; produces from 10 to 12 rather slender, cylindrical flowering stems in a stool. The trunk is characterized by a black epidermis with reddish blotches.

The leaves are green throughout, less glaucous below; the matured blades from 190 to 235 cm long and from 58 to 65 cm wide; firm in texture, not easily broken by the wind; petiole of medium length, from 35 to 40 cm.

The spathe is from 43 to 45 cm long and from 10 to 12 cm wide, longitudinally pitted inside, green and glaucous outside, elongate-lanceolate, not involute at the tip. The spike bears from 5 to 7 hands of matured fruits. The time from sprouting to flowering is usually twelve months.

The flowers (Plate XIV, figs. 6–9) are white, with greenish peduncle like the lacatan, often 10 to a fascicle, from 0.5 to 7.5 cm long and from 1 to 1.5 cm wide; the perigonium with deep sinuses; the scale is oblong with narrow scarious margin, the apex suddenly acute, surface deeply depressed, not deeply shouldered. Stamens of the sterile flowers longer than pistil and calyx, two or three aborted; the stigma is somewhat turbinate and lobed.

The fruits are long, slightly curved and slightly 5-angled, from 14 to 16 cm in length and from 3 to 4 cm in width, usually 10 in a hand; average weight of matured fruit, 85.4 grams. The skin when ripe is thick, yellow or greenish, often shaded with black spots, the pulp is sweet and melting, not fibrous nor coarse, creamy at maturity, with an appreciable apple flavor.

This variety ranks as one of the first-class eating bananas. Blanco's description of this variety is translated as follows:[28]

> Fruit.—It is longer than that of the *lacatan*.
>
> The cortex is always green like that of the *tampohin*; but that of the latter does not show small stains somewhat straw-colored at maturity like that of the *buñgulan*. The angles are not so noticeable, as in the other species; and they almost disappear at complete ripening, as is generally the case with all bananas. The flesh has a very delicate odor and taste, and this banana would be mostly highly esteemed if it were not for the fact that there is attributed to it, whether with reason I do not know, the property of being extremely cold. T., buñgulan.

Other names for this variety have been given as *baluñgun* (Vis.), *banglana*, and *tomoc*.

[28] Fl. Filip. ed. 2 (1845) 171.

MUSA SAPIENTUM L. var. **BINUTIG** var. nov. Binutig. Plate XII, figs. 1–5.

Produces 13 or more flowering stems in a stool. The trunk is green and cylindrical. It reaches a height of from 340 to 360 cm and a diameter of from 20 to 21 cm.

The leaves are green, shiny above, glaucous below, usually brittle; the matured blades are from 203 to 225 cm long and from 66 to 67 cm wide, with long petioles, from 65 to 70 cm in length.

The spike bears 6 hands of matured fruits. The spathe is red and longitudinally pitted inside and is green outside, from 65 to 67 cm long and from 12 to 13 cm wide.

The flowers (Plate XII, figs. 1, 2, and 4) are purple or pink, usually from 7 to 12 in a fascicle, from 7 to 7.5 cm long and from 1 to 1.25 cm wide; the perigonium narrows toward the tip and is shallow; the scale is oblong and has a narrow scarious margin, with rigid acuminate tip; the surface is much rounded but slightly depressed at the base of the tip, two-thirds as long as perigonium; stamens little longer than pistil and as long as perigonium; the stigma is oblong.

The fruits are large, with thick skin, narrowing to the tip, and with long shank, or pedicel, usually 5-angled, from 18 to 20 cm long and from 5 to 6 cm in diameter. They are yellow when ripe. The pulp is coarse, spongy, creamy, and with strong "saba" taste and flavor. A core is usually more or less developed.

The average weight of the mature fruit is 165.96 grams.

MUSA SAPIENTUM L. var. **GARANGAO** var. nov. Garangao. Plate X, figs. 6–10.

Plant reaches a height of from 340 to 350 cm and has a diameter of from 18.5 to 19.5 cm at the base; produces 8 or more flowering stems. The trunk is cylindrical, green.

The spike bears 6 hands of matured fruits. The spathe is from 45 to 50 cm long and from 23.5 to 24.5 cm wide, red, smooth toward the tip, and partly longitudinally pitted inside; green outside and purple along the edges.

The flowers (Plate X, figs. 6, 7, and 8) are purplish, usually from 7 to 12 in a fascicle, from 7.5 to 8 cm long and from 1 to 1.25 cm wide; the perigonium with shallow sinuses, narrow; the scale is oblong, and has a thin scarious margin, with ridged acuminate tip, the surface is slightly depressed; stamens about as long as pistil and perigonium; the stigma oblong.

The fruits are large, narrowed toward the tip, 5-angled, from 18 to 20 cm long, and from 5 to 7 cm in diameter; skin thick, glaucous when unripe and yellow when mature.

The pulp is somewhat creamy in color, coarse and spongy, acid-sweet and of strong flavor, with more or less developed core. The average weight of a mature fruit is 170.51 grams. Seeds are absent.

MUSA SAPIENTUM L. var. **TUDLONG** var. nov. Tudlong dato. Plate II, figs. 6–10.

Plant reaches a height of from 230 to 260 cm and has a diameter of 14 cm at the base; produces from 8 to 11 slender, cylindrical flowering stems in a stool. The trunk is brownish yellow with black patches.

The leaves are light green, narrow and thinnish, with reddish margin; matured blades from 162 to 215 cm long and from 51 to 57 cm wide; petioles from 40 to 50 cm long.

The spike is long, bearing from 5 to 7 hands of mature fruits forming a long fruit cluster.

The flowers (Plate VIII, figs. 6, 7, and 10) are white, except that the peduncle is greenish, usually 13 or 14 in a fasicle, 5 cm in length; perigonium with shallow sinuses; the scale ovate, thin-margined, with short acute tip, half as long as perigonium; stamens longer than pistil or perigonium; stigma oblong-elongate.

The fruits are narrow, but long and slightly 5-angled, narrowing toward a long tip and flattened to a short stipe or pedicel, from 15 to 16 cm long and from 3 to 4 cm wide. The fruits all strongly curved downward parallel to and around the rachis, green when unripe and yellow when mature. The skin is thick. The pulp is sweet, cream-colored, and may be eaten without cooking. The weight of a mature fruit is from 36 to 98 grams.

This variety also goes under the name galamay señora. Blanco mentions the latter as synonymous with dinuguan, but this is incorrect. His description of the variety *glaberrima,* however, clearly belongs to dinuguan.

Other Philippine names for this banana are *gonyod, kinamay dalaga, tudlo-dalaga,* and *tudlug-dato.*

MUSA SAPIENTUM L. var. **GLAUCA** (Blanco). Veinte cohol, tinalong. Plate IX, figs. 6–10.

Musa paradisiaca glauca Blanco.

Produces from 10 to 12 cylindrical stems in a stool; the trunk is green, characterized by a blackish epidermis. The plant attains a height of from 190 to 200 cm and a diameter of from 13 to 15 cm at the base.

The leaves are green and rather brittle; the mature blades are from 135 to 165 cm long and from 62 to 69 cm wide, with the

petioles from 35 to 36 cm long; the petioles are often black-spotted at the base.

The spike generally produces 7 or 8 hands of mature fruits.

The flowers (Plate IX, figs. 6, 7, and 8) are white, small, from 4.5 to 5 cm long and from 0.4 to 0.6 cm wide, usually 16 to a fascicle; the perigonium with deep sinuses; the scale obovate with thin margin, two-thirds as long as perigonium, the apex abruptly acute, not very deeply shouldered, the surface somewhat rounded and slightly depressed near the apex. Stamens longer than perigonium or pistil, the anthers reddish in color; the stigma shallowly lobed.

The fruits are short and oblong, from 7 to 10 cm in length and from 2.5 to 3.5 cm in diameter, often 16 in a hand, yellow when ripe. The average weight of a mature fruit is 57.15 grams. The pulp is slightly acid with distinctly "apple" flavor and with creamy color at maturity. Style persistent. Skin very thin, probably the thinnest of any banana.

This variety is considered to be one of the best among the first-class eating bananas.

Blanco's description of this variety is translated as follows:[29]

> The fruit is small, with very thin skin of bluish color, oval in shape, without angles; sometimes it has a length of two inches or even as short as one, cylindrical, and very obtuse on both ends. Its flesh tastes between sour and sweet, delicate and delicious.
>
> T., bingticohol, tinalong.

MUSA SAPIENTUM L. var. **DARYAO** var. nov. Daryao, daliao. Plate VIII, figs. 1–5.

Produces 5 or more rather slender flowering stems in a stool, reaches a height of from 220 to 240 cm, and has a diameter of from 12 to 13 cm at the base. Trunk is green with occasional blotches of black and purple.

The leaves are thin and green with reddish margins; the matured blades are from 150 to 155 cm long and from 45 to 50 cm wide; petioles green with reddish edges, from 40 to 50 cm long.

The spike usually bears 6 hands of mature fruits.

The flowers (Plate VIII, figs. 1, 2, and 5) are very small, white, usually 6 in a fascicle; the scale is oblong with a long, wrinkled or ridged, acuminate tip, sometimes depressed on the surface, two-thirds as long as perigonium; the stamens are longer than the pistil, and as long as perigonium; the stigma is elongate-oblong.

The fruits are green, cylindrical, narrowed toward the long

[29] Fl. Filip. ed. 2 (1845) 175.

tip, 13 cm long and 3 cm in diameter. Fruits are arranged in loose order and at various angles. The pulp is firm and reddish yellow when ripe. The skin is yellow when ripe and of medium thickness—that is, less in thickness than in the bon̄golan. The average weight of a mature fruit is 46.72 grams.

Like other bananas, such as the *lacatan* and the *veinte cohol*, the fruits of this variety are eaten without cooking, but will serve equally well if made into figs.

MUSA SAPIENTUM L. var. **TERNATENSIS** (Blanco). Ternate, gloria. Plate VII, figs. 1–5.

Musa paradisiaca ternatensis Blanco.

Produces only a few flowering stems in a stool, usually 3; the trunk is large, cylindrical, brownish, with bloches of red and black, reaching a height of 390 cm and a diameter of 24 cm at the base. Leaves large, broad and green throughout; mature blades from 210 to 220 cm long and from 60 to 65 cm wide; petioles from 50 to 55 cm long.

The spike usually bears from 14 to 18 mature fruits.

The flowers (Plate VII, figs. 1, 2, and 5) are 7.5 cm long, with yellowish perigonium and white scale, the peduncles ringed with purplish color; the scale is ovate, with scarious margin and long, narrow, acute tip, rounded on the surface, half as long as perigonium; stamens longer than pistil, anthers shorter than filaments; the stigma elongate-oblong.

The fruits are of medium size, slightly tapering toward the tip and wider toward the base, with very short pedicels. The skin is thick, like that of the *saba*. The flesh is yellowish, coarse, fibrous, and with strong banana odor. The average weight of a mature fruit is 97.98 grams.

Blanco's description of this variety is translated as follows:[30]

> Flowers: Each bract covers something like twenty small hermaphrodite flowers. The lower petal terminates in a depression on the exterior part; the upper one as in the variety *compressa*. Stamens number five without the rudimentary sixth. Fruit, with three very prominent angles and sometimes four or five, crowned with the flower that persists up to the maturity of the fruit. This species grows to the same height as the preceding one. Although in appearance one is scarcely distinguishable from the other, the natives know how to tell them by the color of the leaves. The fruit is more than 5 inches long, and it is one of the most delicious if allowed to mature on the stem. This seldom occurs, because the native makes haste to convert it into money, even hastening its maturity by immersing the fruit in sea water or hanging it in a hole covered with leaves, or placing it without cutting in a sack with straw or leaves,

[30] Fl. Filip. ed. 2 (1845) 170.

or by using other violent methods. The seeds seldom become perfect, but occasionally such are found when the fruit is mature.

Ternate, gloria.

MUSA SAPIENTUM L. var. **LACATAN** (Blanco). Lacatan. Plate XI, figs. 1–5.

Musa paradisiaca lacatan Blanco.

Produces from 2 to 6 rather slender flowering stems in a stool, characterized by black epidermis on the trunk. It reaches a height of from 300 to 330 cm and has a diameter of from 16 to 19 cm at the base.

The leaves are green throughout and thickish; the mature blades are from 240 to 245 cm long and from 77 to 80 cm wide, with petioles from 50 to 60 cm in length.

The spike often bears from 5 to 8 hands of mature fruits. The time from sprouting to flowering is usually twelve months.

The flowers (Plate XI, figs. 1, 2, and 4) are white, with greenish peduncle, usually 14 to a fascicle, from 7 to 7.5 cm long, the perigonium with shallow sinuses; the scale obovate, with narrow scarious margin, half as long as the perigonium, the apex suddenly acute, deep-shouldered; the surface of scale deeply depressed or rounded; stamens longer than perigonium and pistil, all fertile; the stigma is shortly lobed.

The fruits are long and usually slightly 4-angled, from 12 to 16 cm in length and from 3 to 4 cm in diameter, often 14 in a hand, yellow when ripe, and with thick skin, but thinner than that of the *saba*. The average weight of a mature fruit is 79.2 grams. The pulp is sweet and melting and is yellowish at maturity.

This variety is one of the best sorts in common culture in the Philippines.

Blanco's description of this variety is translated as follows:[31]

Flowers: Each bract covers fourteen small hermaphrodite flowers. Corolla: The superior lip with five teeth; the three alternate ones larger. The inferior lip projects ventrally terminating in two low cuts and a small horn and a row of small depressions. Stamens five, with rudimentary sixth, and seldom six perfect. Stigma manifestly split into two parts; the one subdivided into two lobules, and the other into three or four. Fruit with the terminal part obtuse, and with angles like those in the preceding species, but they almost disappear at maturity, crowned with the flower which persists until the ripening of the fruit.

This species is native in Pampanga, and about forty years ago it was not known in Manila. An Augustinian priest promoted its propagation throughout Bulacan Province, and to-day it is very common. The fruit becomes as large as the variety *gloria;* but its flesh is denser, more con-

[31] Fl. Filip. ed. 2 (1906) 170.

sistent, odorous, and according to many people it has the supremacy over other species. In fact it seems that it has the flavor and odor of the buñgulan with the consistency and wholesomeness of the *ternate*.

T., lacatan.

MUSA SAPIENTUM L. var. **CANARA** var. nov. Canara. Plate XII, figs. 6–10.

The whole plant reaches a height of 223 cm and has a diameter of 14.5 cm at the base. The trunk is whitish green.

The leaves are broad, deep, 164 cm long and 81 cm wide, very brittle, all the leaves of the plant being usually transversely split by the wind and commonly rapidly drying up. The petioles are short, measuring only 37 cm in length.

The spike bears 7 hands of mature fruits.

The flowers (Plate XII, figs. 6, 7, and 9) are white with a greenish peduncle; the scale is oblong with acute tip and scarious margin, depressed on the surface. The stamens are longer than the pistil. The stigma is shortly lobed.

The fruits are closely packed together at right angles around the rachis, 12 mature fruits in a hand; the skin is thick but fragile, yellow when ripe, tapering toward the sessile base; the pulp is yellow, coarse, granular, not fibrous, mild in taste and strongly aromatic; the average weight of a mature fruit is 140.25 grams.

MUSA SAPIENTUM L. var. **INARNIBAL** var. nov. Inarnibal. Plate IX, figs. 1–5.

Produces 11 or more slender cylindrical flowering stems in a stool. The whole reaches a height of 292 cm and has a diameter of 16 cm at the base. The trunk is characterized by a black epidermis.

The leaves are thin, light green, often spoken of as yellowish green; the mature blades are 199 cm long and 53 cm wide, not glaucous below.

The spike often bears from 5 to 7 hands of mature fruits. The flowers (Plate IX, figs. 1, 2, and 5) are small, white, usually 19 in a fascicle, 4 cm long and 5 mm wide; the perigonium with deep sinuses; the scale is oblong, thin, with acute tip; the surface is often channeled or depressed, half as long as perigonium; stamens longer than perigonium or pistil; the stigma is elongate-oblong.

The fruits are green, oblong and small, often slightly angled by depression. The fruits are arranged around the rachis in loose order, often 19 in a hand, from 6 to 7 cm long with a diameter of from 3 to 4 cm. The pulp is fine, sweet, and melting

when ripe, possessing a thin and yellow skin. The average weight of a mature fruit is 49.78 grams.

The Tagalog word *inarnibal* means "like molasses to the taste." As a matter of fact, although the fruits are small, they are considered to be one of the best bananas for eating uncooked.

MUSA SAPIENTUM L. var. **TULDOC** var. nov. Tuldoc. Plate X, figs. 1–5.

Produces 4 or more flowering stems in a stool. The trunk is cylindrical with blotches of black and purple, and is 328 cm high and 20 cm in diameter at the base.

The leaves are green above and glaucous below, with purplish midribs and margins, the mature blades 190 cm long and 65 cm wide; the petioles are also purplish below and about 65 cm long.

The spike bears 5 or more hands of mature fruits.

The flowers (Plate X, figs. 1, 2, 5) are of medium size, usually 10 in a fascicle, the peduncle greenish; the perigonium is white with shallow sinuses; the scale is oblong, white with acuminate tip, shouldered, wrinkled or depressed on the surface, two-thirds as long as perigonium; stamens longer than perigonium or pistil; anthers shorter than filaments; the stigma is short-lobed.

The fruits are a little larger than the fruits of the *inarnibal,* the tips are slightly tapering and wider toward the sessile base, often angled by depression. Style and calyx persistent; skin thick, yellow when ripe. The pulp is cream-colored, fine, and palatable. The fruits are often 10 in a hand. The average weight of a mature fruit is 69.93 grams. This is not to be confused with the *tundoc.*

MUSA SAPIENTUM L. var. **LONGA** (Blanco). Guinanayan.

Musa paradisiaca longa Blanco.

This well-marked variety is described by Blanco [32] very briefly. The translation is as follows:

Individual fruit with a tapering tip, long, and a little thick. Its taste is good; but not that of the best ones.
T., guinanayan.

This variety will be given critical study later.

MUSA SAPIENTUM L. var. **TOMBAK** (Blanco). Tinumbaga, goyoran.

Musa paradisiaca tombak Blanco.

This variety is very briefly described by Blanco [33] as follows:

The fruit is of an ordinary size. The flesh is one of the delicious ones.
T., tinumbaga, goyoran.

[32] Fl. Filip. ed. 1 (1837) 245.

[33] Fl. Filip. ed. 1 (1837) 246.

This is a distinct variety, which we have in culture; it will be critically examined later. Its name is sometimes spelled *tenon-baga* or *tumbaga*.

MUSA SAPIENTUM L. var. **COMPRESSA** (Blanco). Saba. Plate VII, figs. 1–5.

Musa paradisiaca compressa Blanco.

Produces 14 or more flowering stems in a stool. Characterized by the deep green skin of the trunk. The whole plant reaches a height of from 480 to 500 cm or even higher and has a diameter of from 32 to 35 cm at the base.

The leaves are broad, thick and leathery, deep green and shiny above, waxy below, from 264 to 267 cm long and from 81 to 83 cm wide; petiole from 69 to 78 cm long.

The spike bears about 11 hands of mature fruits.

The flowers (Plate XVII, figs. 1, 2, and 3) are of medium size, from 16 to 19 in a fascicle, from 6.5 to 7 cm long and from 1 to 1.3 cm wide; the perigonium with shallow sinuses; the scale is often shaded with pinkish, the surface rounded with acute tip, two-thirds as long as perigonium; stamens shorter than pistil or as long as perigonium; the stigma is short-lobed.

The fruits are usually large and flattish with a long pedicel, from 17 to 18 cm long, slightly tapering toward the tip, and usually 5-angled; seeds present, but few; skin thick and yellow when ripe; the pulp coarse and white with a more or less developed core. Not palatable when raw, but excellent when cooked. The average weight of a mature fruit is 74.21 grams.

Blanco's description of this variety is translated as follows:[34]

> Stem cylindrical, formed by the petioles of the leaves, which serve as sheath. This is characteristic of all bananas. Leaves elliptical, elongated, very large. Flowers all hermaphrodite, placed in a common receptacle, provided with bracts, or large spathes, monophyllous, ovate, imbricated, which receptacle elongates greatly as the flowers develop. Each bract covers about twelve small flowers. Corolla of two petals; the upper one has the limb split into five parts; the three terminate in small hoods, the other two upper ones smaller, without hoods, and emerge from the interior part between the divisions of the first three. The lower petal without a depression outside. Stamens, five perfect and the sixth rudimentary. Anthers very long and covered with abundant pollen. Style a little longer than the stamens. Stigma thick, compressed, with protuberances. The fruit usually is a little more than 3 inches in length and 1 in thickness, with three angular ridges, although it frequently has even five, formed by mutual compression of the fruit. Each raceme has sometimes, although rarely, more than four hundred fruits crowned with flowers even at maturity. This banana plant, called in some parts of the Islands *bisco*,

[34] Fl. Filip. ed. 2 (1845) 168.

grows to a height of from nine to twelve feet according to the soil, without including the leaves which sometimes are eight or nine feet in length and two in width. Its fruit is one of the most valued kinds; because it is assuredly very wholesome; and this as well as the other species are "naricticos," but if they are not thoroughly ripe they are flatulent, especially those that have thick skin. The Spaniards call it *obispo*, corrupting surely the name given above. The pulp of its fruit seems to be filamentous, or full of a threadlike substance; but its taste is a little sour and is inferior in this respect to that of many other species which have every reason to be just as wholesome. The flowers have a disagreeable odor, as is true of those of the other bananas. The use that is made of its leaves for wrapping is very well known. The fibers and the petioles are used for tying. The skins of the fruit, when dried and ignited, give ashes highly appreciated by women that dye with "bancudo" or "niño." The stem of this species, as well as that of the others, contains a good deal of water. When cut by the natives close to the root, which is somewhat globular and bigger than the head of a man, the hole due to the excavation soon becomes filled with water. After one day the water sours, and they put in it tinder that they gather from the *cavon* (*cabo negro, Arenga saccharifera*). By this means the tinder becomes inflammable at the strike of the steel against the flint.

The seeds of these bananas almost never attain great size; but once in a while there are found isolated seeds well nourished and perfect. In order that they may become perfect I think that it would be necessary to exterminate carefully all the new small stems that shoot out of the main root, and not only these stems but all the buds that are found on the stock ready to shoot out. I have heard from the natives that banana plants from which leaves are cut with frequency give but small fruit, and then some seeds are found. The shape of those seeds that are found perfect is circular, very depressed, with a nipple on one surface and a naval on the other. All of the isolated seeds of the other species which I have found usually have the same shape. In order to obtain very large bananas, most of the fruits are cut from the raceme. It is thought by some that to accelerate the time of bearing it is necessary to plant the sprout from the root upside down, but by this means very little is gained.

In the Visayan Islands a very fine cloth is made from the fibers produced by this plant; this cloth in similar to that made from abacá. Some use the dry leaves of the banana plant to rub the floors of their houses in order to give them luster; by this means the floors become so slippery as to be even dangerous.

Tagalog: *Saba, bisco, obispo.* There are several varieties of this species. The one mentioned here is the commonest found in Batangas and in which the stamens is sterile. In the Visayan Islands there is one variety with small fruit; and in Parañaque, Rizal Province, another which has a big fruit called *sabang Iloco.*

The *saba* and the *sabang Iloco*, together with the *kadismon*, *moco*, *mundo*, and other related forms, constitute a well marked group, which is clearly distinct from all of our other bananas. I include them in *sapientum* for the present, but further study may show them to be specifically distinct.

MUSA SAPIENTUM L. var. **GRANDIS** var. nov. Sabang Iloco. Plate XIV, figs. 1–3.

Plant reaches a height of from 350 to 360 cm and has a diameter of from 22 to 22.5 cm at the base; the trunk is large, cylindrical, green, and has from 3 to 5 flowering stems in a stool.

The leaves are deep green, shiny above and glaucous below; the mature blades are from 230 to 232 cm long and from 66 to 70 cm wide; the petioles are from 55 to 60 cm long.

The spike usually bears 5 hands of mature fruits; the spathe is 53 cm long and 22 cm wide, red, and longitudinally pitted inside, green and glaucous outside.

The flowers (Plate XIV, figs. 1, 2, and 3) are large, 9 cm long and 2 cm wide, usually 13 or 14 in a fascicle; the perigonium is purplish, with shallow sinuses; the scale purple, obovate, with thin margin and long acuminate tip, rounded on the surface with occasional wrinkles at the base, often shouldered but shallowly so, stamens shorter than perigonium or pistil, two-thirds as long as perigonium; the stigma is oblong.

The fruits are the largest of all the varieties here placed under this species, from 21 to 22 cm long and from 6 to 7 cm in diameter, oblong in shape, 5-angled, narrowing to the tip, with long pedicel (often 5 cm), usually 13 or 14 fruits in a hand, deep green when unripe and yellow when ripe; pulp reddish white, coarse and spongy; skin thick; usually seedless, palatable when cooked. The average weight of a mature fruit is 262.4 grams.

MUSA CAVENDISHII Lamb.

This species was named *M. chinensis* by Sweet and *M. sinensis* by Sagot. Southern China is said to be its native home. Cultivated in Mauritius and introduced to England in 1827. Now extensively grown in all tropical and subtropical countries.[35]

Baker's description of this species is as follows:[36]

*9. **M. cavendishii**, *Lamb.* M. chinensis, Sweet (name only); North Gallery, Nos. 225, 816; M. sinensis, *Sagot.* Stoloniferous. Whole plant 4–6 feet high; leaves 6–8 inches in a dense rossette, spreading, oblong, 2–3 feet long, about a foot broad, much rounded at the base, rather glaucous;

[35] Kew Bull., Add. ser. VI pt. 2 (1906) 16.
[36] Kew Bull., Add. ser. VI pt. 2 (1906) 16.

petiole short, stout, deeply channelled, with two broad crisped green edges. Rachis short, stout. Spike dense, oblong, 1–2 feet long, drooping; bracts red-brown or dark brown, ovate, the lower 6 inches long, the upper 3–4 inches; male flowers and their bracts persistent. Fruit as many as 200–250 to a panicle, oblong, 6-angled, slightly curved, 4–5 inches long, above 1½ inches diameter, obtuse, narrowed gradually to the sessile base, seedless, edible, with a rather thick skin and delicate fragrant flesh. *Distribution:*— Native of Southern China. Cultivated in Mauritius, and introduced to England in 1827. This is now extensively cultivated in all tropical and sub-tropical countries and known as the "Chinese or Dwarf" banana. It furnishes a large proportion of the bananas usually sold in this country. The wild seed-bearing form is not yet known. *M. Massouni,* Sagot (name only), supposed to be wild at the Gaboon and cultivated in Bourbon, is said to be like *M. Cavendishii* but with slightly different fruit.

In the Philippines only two varieties, called *poot* and *tampohin,* or *tampihan,* are to be included under this species, so far as known to us; other varieties like *salebaguito* may belong here. They need study.

MUSA CAVENDISHII Lamb. **var. HAWAIIENSIS** var. nov. Plate XV, figs. 6–10.

Among the College of Agriculture plantings there is a dwarf banana received from Hawaii which is evidently to be referred to *cavendishii,* but which represents a distinct varietal form. It is described as follows:

Stoloniferous from the base, producing from 8 to 10 flowering stems in a stool. Trunk cylindrical and green, measuring from 16 to 18 cm in diameter at the base and reaching a height of from 130 to 150 cm.

The leaves are oblong, deep green on the upper surface and glaucous below, usually thick and rounded at the base and apex. The length of a mature blade is from 135 to 145 cm and the width from 69 to 73 cm, petiole from 12 to 24 cm long, stout, deeply channeled and scalloped in cross section.

The inflorescence is a large pendant spike with fertile flowers toward the base and sterile staminate flowers toward the apex. The basal bract or spathe is large, elongate-lanceolate, and does not generally bear flowers in its axil; it is dull brown and usually longitudinally pitted inside, green outside with leaflike appendages at the tip. It measures from 50 to 60 cm in width. The time to flowering is usually from twelve to fourteen months.

The flowers are arranged in dense, 2-rowed fascicles in 3-ranked spirals. The average size of the flower is 6.3 cm long and 1 cm wide, from 14 to 16 fertile flowers occurring in a fascicle and usually 7 fascicles in an inflorescence; perigonium long tubular with irregular thin margin divided to the base on

one side, 5-toothed at the apex, the lobes finally decurved. Scale not very thin, with scarious margin, ovate, usually about half as long as the perigonium, the color is generally white, the tip is acute and slightly shouldered, some are entire. Flowers beyond 4 to 10 basal fascicles, sterile, the sterile deciduous flowers maturing gradually, the basal at about the same time as the basal fertile flowers. The stamens of the terminal flowers are not at all aborted or sterile. The perfect stamens are shorter than the pistil, the filaments are usually shorter than the anthers. The stigma is shortly lobed.

The fruits are oblong, elongate, 4- or 5-angled, and often slightly curved, from 14 to 16 cm long, from 2.5 to 3 cm in diameter forming 7 hands in a bunch, with from 14 to 23 fruits in a hand. The hands on the rachis are closely packed together at an angle of about 45 degrees. The fruits are thick skinned and are narrowed gradually toward the sessile base. The flesh is delicate with a strong agreeable flavor. The pulp is white when ripe. The fruit is seedless and somewhat greenish when mature.

MUSA CAVENDISHII Lamb. var. **PUMILA** (Blanco).

Musa paradisiaca pumila Blanco.

Blanco's description of this variety is translated as follows:[37]

Fruit is like that of the bungulan, which I will describe later, but not with savory taste; the stem is very small, and the racemes reach the ground. The natives call it *tampohin,* or fretful, because if they cut its leaves it dies.

T., tampohin.

MUSA PARADISIACA L.

Schumann considers *sapientum* a subspecies of *paradisiaca,* while Baker considers *paradisiaca* a variety of *sapientum.* Under the circumstances they may well remain separate until complete varietal studies can be made.

Baker's description of *paradisiaca* is as follows:[38]

*Var. *M. paradisiaca,* Linn. Sp. Plant. 1477; Trew, Ehret. t. 18–20. Male flowers and bracts less deciduous. Fruit cylindrical, ½–1 foot long, generally yellow or yellowish green when ripe with firmer and less saccharine pulp, not fit to eat without cooking. Common plantain. Cultivated universally in the tropical zone.

On page 26–27 of this same work he further discusses the plantain as follows:

[37] Fl. Filip. ed. 2 (1845) 171.
[38] Kew Bull., Add ser. VI pt. 2 (1906) 22.

This was recognized by Roxburgh under the Hindu and Bengali name of "katch kulla." It is the "large or cooking plantain" of Europeans in India, the Spanish "platano arton," the "banane" of French Guiana and Surinam, according to Aublet; while Rochefort, already cited, speaks of it as "le bananier." He adds, "It is 12 to 13 inches long and nearly as thick as the arm. The tree bears only 25 to 30 fruits on the raceme and these are rather laxly placed. They have a hard and dry flesh fitted only for cooking or for being roasted in ashes." It is the sort typically represented by the "pisang tandok" of the Malays. Ligon in 1657 called it "plantine." This shows the antiquity of the common name amongst the English. Plantain was evidently originally derived from the Spanish name "plantano," altered by Joseph Acosta and subsequent writers into "platano." "Plantain," as remarked by Kurz, was an awkward introduction into the English language, as it was already applied to the common Rib-grass, a species of *Plantago*. Kurz, it may be added, contrary to general practice, in the East discarded the word "plantain" altogether, and his writings used the word "banana" exclusively, for the edible fruit of Musas.

Grisebach describes the stem of the plantain as "green" and the fruits "ascending" (or curved upwards) "about a foot long." This curving upwards is characteristic of the Horn plantain, but it is not distinctive enough to separate plantains and bananas in general. prevailing habit of the leaves, according to Sir William Hooker, is that they are "much longer and narrowed into the petiole" than in the banana. The male flowers and the bracts are not so deciduous as in the banana, and the portion of the spike beyond the fruit is much shorter and usually covered with the remains of the bracts and dried up flowers. The individual fruits again are very distinct. They have a firmer and less saccharine pulp and are not fit to eat without cooking.

In the Philippines there are a number of varieties best referred here. Prominent among these is the *tundoc*. Apparently there exist here a number of other distinct forms like the *balongcaue* of Albay, which remain to be studied.

MUSA PARADISIACA L. var. **MAGNA** Blanco. *Tundoc.*

Blanco's description is translated as follows:[39]

Fruit with three or more angles which disappear at maturity. This plant produces but few fruits on the raceme; but in compensation they are of very large size, sometimes more than a foot in length. This fruit when cooked has a taste resembling that of apples, and for that reason it is highly esteemed. Cloth is also made of the stem, as from the abacá; but it is not so good.

Tagalog, tundoc.

Other names for the *tundoc* are *boracho* and *tondoc*. But none of these should be confused with the name *tuldoc*.

[39] Fl. Filip. ed. 1 (1837) 244.

MUSA PARADISIACA L. var. **MAXIMA** Blanco. Batavia, matavia, langai, anuang.

This variety is described by Blanco. The translation is as follows:[40]

Individual fruit very large, long, and thick and of consistent flesh, but not very delicious. I do not know whether it is native of the Islands.

T., batavia, matavia, langai, anuang.

Questionably placed here, although from the description apparently one of the plantains. Material for study will be available later.

MUSA PARADISIACA L. var. **ULNARIS** Blanco.

Blanco's description of this species is translated as follows:[41]

This banana is only known by the Negritos of the mountains of Balanga, who sometimes bring its fruit down to the neighboring towns. Those who have seen and eaten it report that it is as thick as the calf of the human leg, and that it reaches a length of six feet. It is a monstrosity. It has no seeds; it is eaten when cooked, and its taste resembles that of the *tondoc*. I take this report as certain, but not what the Negritos say in regard to the raceme producing only one fruit. I rather believe that the others do not develop to perfection.

The existence of this banana is questioned, since it has never been seen since its description. Its size is probably greatly overstated. It seems likely, from statements by Filipinos, that varieties of *paradisiaca* with fruits of great size and few in number in a bunch do exist in the Islands. The above form should be sought in the original locality, that is in the mountains back of Balanga, Bataan Province, Luzon.

MUSA PARADISIACA L. var. **SUBRUBEA** Blanco. Hanatuco morado. Plate XVI, figs. 1–5.

The whole plant reaches a height of from 340 to 350 cm and has a diameter of from 20 to 25 cm; it produces from 3 to 5 cylindrical flowering stems in a stool; the trunk often is mottled with black patches.

The leaves are green; mature blades from 210 to 212 cm long and from 68 to 69 cm wide; petiole from 60 to 65 cm in length.

The spike bears 5 hands of mature fruits.

The flowers (Plate XVI, figs. 1, 2, and 4) are large and purple, from 8 to 8.5 cm long and from 1 to 1.5 cm wide; the perigonium is narrow with shallow sinuses; the scale is oblong, often rounded

[40] Fl. Filip. ed. 1 (1837) 245.
[41] Fl. Filip. ed. 1 (1837) 246.

on the surface, tip acuminate, not so deeply shouldered, with narrowly scarious margin, half as long as perigonium; stamens shorter than perigonium or pistil; the stigma is oblong.

Fruits oblong or cylindrical, slightly angled by depression, long pedicelled, 16 to 18 cm long and 5 to 6 cm in diameter; often from 10 to 12 in a hand; skin thick, slightly shaded with purple when unripe, and brown with numerous cracks at maturity (in our specimens). The pulp is cream white, coarse, with harder core. The average weight of a mature fruit is 147.93 grams.

Blanco's description of this variety is translated as follows:[42]

> The fruit is of the same size as that of the *ternate,* with angles, somewhat red, and in taste it resembles this a little; but when cooked has a taste similar to the *tondoc.* It is not a common variety. The ignorance of the natives of the neighborhood of Manila prevents them from giving it a name. They only say that it is the "*platano de la Costa.*"

MUSA NIGRA Perrottet, Mém. Soc. Linn. Paris III (1825) 131.

This species was described from the Philippine Islands, but has apparently never been recognized since. It is probably but a form or variety of *Musa sapientum.*

MUSA CHAPARA Perrottet, Mém. Soc. Linn. Paris III (1825) 131.

This species also was described from the Philippines, but has not since been recognized. Like the preceding, it is probably only a form or variety of *Musa sapientum.*

Mr. E. D. Merrill, botanist, Bureau of Science, Manila, says that the six or more species and very many varieties admitted as Philippine by Naves[43] must be excluded, or enumerated as doubtful.

USES OF PHILIPPINE BANANAS

1. Best for eating uncooked: Lacatan, veinte cohol, tudlong dato, bungulan, inarnibal.
2. Medium quality for eating uncooked: Ternate (gloria), letondal (tordan).
3. Suitable for cooking: Tondoc, saba, sabang Iloco, hanatuco morado.
4. Flowers cooked as a vegetable: Saba.
5. Suitable for making dried banana figs: Pitogo, ternate, sweet varieties of saba.
6. Suitable for making into banana flour: Tonduc, batavia, saba (varieties with hard white pulp).

[42] Fl. Filip. ed. 2 (1845) 171.
[43] Fl. Filip. ed. 3 IV (1880–83).

7. Used for making vinegar: Botoan, saguing machin.
8. Used for fiber: Abacá, saguing machin, saba, tudlong dato.
9. Trunks used for hog feed: Saba, tudlong dato.
10. Used for medical purposes: Botoan.
11. Used for wrappers and binders: Botoan, saba.
12. Ornamental only: Abyssinian banana, red-flowered banana, virgen.

SPECIES AND VARIETIES OF THE GENUS MUSA REPORTED FROM THE PHILIPPINE ISLANDS

1. **MUSA ENSETE** Gmel. Abyssinian banana.
1. **MUSA GLAUCA** Roxb. Virgen.
Musa trogloditarum dolioliformis Blanco.
3. **MUSA COCCINEA** Andr. Red-flowered banana.
4. **MUSA TEXTILIS** Née. Abacá, with many undescribed varieties.
Musa trogloditarum textoria Blanco.
Musa abaca Perr.
5. **MUSA ERRANS** (Blanco).
Musa trogloditarum errans Blanco.
var. **BOTOAN** var. nov. Botoan, butuhan.
6. **MUSA HUMILIS** Perr. Pitogo.
7. **MUSA SAPIENTUM** L. The true bananas.
var. **CINEREA** (Blanco). Letondal, letundan, tordan.
Musa paradisiaca cinerea Blanco.
var. **CUBENSIS** var. nov. Apple banana, manzana de Cuba.
var. **VIOLACEA** (Blanco). Morado.
Musa paradisiaca violacea Blanco.
var. **AMERICANA** var. nov. Cuban red, morado de Cuba.
var. **GLABERRIMA** (Blanco). Durugo, Dinuguan.
Musa paradisiaca glaberrima Blanco.
var. **SUAVEOLENS** (Blanco). Bungulan.
Musa paradisiaca suaveolens Blanco.
var. **BINUTIG** var. nov. Binutig.
var. **GARANGAO** var. nov. Garangao.
var. **TUDLONG** var. nov. Tudlong dato.
var. **GLAUCA** (Blanco). Veintecohol.
Musa paradisiaca y glauca Blanco.
var. **DARYAO** var. nov. Daryao.
var. **TERNATENSIS** (Blanco). Ternate, gloria.
Musa paradisiaca ternatensis Blanco.
var. **LACATAN** (Blanco). Lacatan.
Musa paradisiaca lacatan Blanco.
var. **CANARA** var. nov. Canara.
var. **INARNIBAL** var. nov. Inarnibal.

var. **TULDOC** var. nov. Tuldoc.

var. **LONGA** (Blanco). Guinanayan.

Musa paradisiaca longa Blanco.

var. **COMPRESSA** (Blanco). Saba.

Musa paradisiaca compressa Blanco.

var. **GRANDIS** var. nov. Sabang Iloco.

var. **TOMBAK** (Blanco). Tinumbaga, goyoran, and numerous undescribed varieties.

8. **MUSA CAVENDISHII** Lamb. The dwarf bananas.

var. **HAWAIIENSIS** var. nov. Hawaiian dwarf banana.

var. **PUMILA** (Blanco). Tampohin, and a number of undescribed varieties.

Musa paradisiaca pumila Blanco.

9. **MUSA PARADISIACA** L. The plantains.

var. **MAGNA** Blanco. Tonduc.

var. **ULNARIS** Blanco.

var. **MAXIMA** Blanco. Batavia, matavia, langai, anuang.

var. **SUBRUBEA** Blanco. Hanatuco morado, and a number of undescribed varieties.

10. **MUSA NIGRA** Perr.

11. **MUSA CHAPARA** Perr.

GENERAL CONCLUSIONS

1. There is an urgent need of a thorough botanico-pomological study of the bananas and plaintains, especially the cultivated varieties.

2. Neither species nor varieties can be properly made known to botanical science without full descriptions of all parts of the plant and without detailed illustrations. Good photographs will be of the greatest importance in this work.

3. Accuracy in measurement of all the parts of the plant, especially the flowers, is necessary, although in using these measurements, and making comparisons, full allowance should be made for variations due to cultural conditions; this applies especially to the fruits.

4. The characters of the flowers will clearly identify the varieties, quite apart from fruit characters.

5. Many of the varietal names in current use are synonymous. A single variety often bears different names in different localities, while in some cases quite distinct varieties bear the same name. The actual study of authentic material is always necessary.

6. While it is possible to make thoroughly good herbarium reference material, by accompanying dried specimens with photographs and drawings, descriptions should always be drafted from living material.

ACKNOWLEDGEMENTS

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ILLUSTRATIONS

PLATE VII

FIGS. 1 to 5. *Musa sapientum* L. var. *ternatensis* Blanco. Gloria, or ternate.

1, Flower, front view, × 1.25; *2*, flower, side view, × 1.25; *3*, cross section of fruit, × 0.5; *4*, fruit, × 0.5; *5*, scale, × 1.0.

6 to 10. *Musa errans* Blanco var. *botoan* var. nov. Butuhan.

6, flower, side view, × 1.5; *7*, flower, front view, × 1.5; *8*, cross section of fruit, × 0.5; *9*, fruit, × 0.5; *10*, scale, × 1.0.

PLATE VIII

FIGS. 1 to 5. *Musa sapientum* L. var. *daryao* var. nov. Daryao.

1, flower, front view, × 1.5; *2*, flower, side view, × 1.5; *3*, cross section of fruit, × 1.0; *4*, fruit, × 0.5; *5*, scale, × 1.5.

6 to 10. *Musa sapientum* L. var. *tudlong* var. nov. Tudlong dato.

6, flower, front view, × 2.0; *7*, flower, side view, × 2.0; *8*, cross section of fruit, × 0.5; *9*, fruit, × 0.5; *10*, scale, × 2.0.

PLATE IX

FIGS. 1 to 5. *Musa sapientum* L. var. *inarnibal* var. nov. Inarnibal.

1, flower, front view, × 1.5; *2*, flower, side view, × 1.5; *3*, cross section of fruit, × 0.5; *4*, fruit, × 0.5; *5*, scale, × 1.0.

6 to 10. *Musa sapientum* L. var. *glauca* Blanco. Veinte cohol.

6, flower, side view, × 1.75; *7*, flower, front view, × 1.75; *8*, scale, × 1.75; *9*, fruit, × 0.5; *10*, cross section of fruit, × 0.5.

PLATE X

FIGS. 1 to 5. *Musa sapientum* L. var. *tuldoc* var. nov. Tuldoc.

1, flower, front view, × 1.25; *2*, flower, side view, × 1.25; *3*, cross section of fruit, × 0.5; *4*, fruit, × 0.5; *5*, scale, × 1.25.

6 to 10. *Musa sapientum* L. var. *garangao* var. nov. Garangao.

6, flower, front view, × 1.25; *7*, scale, × 1.25; *8*, flower, side view, × 1.25; *9*, fruit, × 0.5; *10*, cross section of fruit, × 0.5.

PLATE XI

FIGS. 1 to 5. *Musa sapientum* L. var. *lacatan* Blanco. Lacatan.

1, flower, front view, × 1.75; *2*, flower, side view, × 1.75; *3*, cross section of fruit, × 0.5; *4*, scale, × 1.75; *5*, fruit, × 0.5.

6 to 10. *Musa sapientum* L. var. *cubensis* var. nov. Apple banana.
6, flower, front view, × 1.25; *7*, flower, side view, × 1.25; *8*, cross section of fruit, × 0.5; *9*, scale, × 1.25; *10*, fruit, × 0.5.

PLATE XII

FIGS. 1 to 5. *Musa sapientum* L. var. *binutig* var. nov. Binutig.
1, flower, front view, × 1.25; *2*, flower, side view, × 1.25; *3*, cross section of fruit, × 0.5; *4*, scale, × 0.5; *5*, fruit, × 0.5.

6 to 10. *Musa sapientum* L. var. *canara* var. nov. Canara.
6, flower, side view, × 1.5; *7*, flower, front view, × 1.5; *8*, cross section of fruit, × 0.5; *9*, scale, × 1.5; *10*, fruit, × 0.5.

PLATE XIII

FIGS. 1 to 5. *Musa sapientum* L. var. *cinerea* Blanco. Latondal.
1, flower, front view, × 1.0; *2*, flower, side view, × 1.0; *3*, fruit, × 0.5; *4*, scale, × 1.0; *5*, cross section of fruit, × 0.5.

6 to 10. *Musa sapientum* L. var. *americana* var. nov. Cuban red.
6, flower, side view, × 1.25; *7*, flower, front view, × 1.25; *8*, cross section of fruit, × 0.5; *9*, scale, × 1.0; *10*, fruit, × 0.5.

PLATE XIV

FIGS. 1 to 5. *Musa sapientum* L. var. *grandis* var. nov. Sabang Iloco.
1, flower, front view, × 1.0; *2*, scale, × 1.0; *3*, flower, side view, × 1.0; *4*, cross section of fruit, × 0.5; *5*, fruit, × 0.75.

6 to 10. *Musa sapientum* L. var. *suaveolens* Blanco. Bungulan.
6, flower, front view, × 1.0; *7*, cross section of fruit, × 1.0; *8*, scale, × 1.0; *9*, flower, side view, × 0.5; *10*, fruit, × 0.5.

PLATE XV

FIGS. 1 to 5. *Musa sapientum* L. var. *glaberrima* Blanco. Durugo.
1, flower, front view, × 1.25; *2*, scale, × 1.25; *3*, flower, side view, × 1.25; *4*, cross section of fruit, × 0.5; *5*, fruit, × 0.5.

6 to 10. *Musa sapientum* L. var. *violacea* Blanco. Morado.
6, flower, front view, × 1.5; *7*, scale, × 1.0; *8*, flower, side view, × 1.5; *9*, fruit, × 0.75; *10*, cross section of fruit, × 1.0.

PLATE XVI

FIGS. 1 to 5. *Musa paradisiaca* L. var. *subrubea* Blanco. Hanatuco morado.
1, flower, front view, × 1.0; *2*, scale, × 0.75; *3*, cross section of fruit, × 0.5; *4*, flower, side view, × 1.0; *5*, fruit, × 0.5.

6 to 10. *Musa cavendishii* Lamb. var. *hawaiiensis* var. nov. Dwarf Hawaiian.
6, flower, front view, × 1.5; *7*, scale, × 1.0; *8*, flower, side view, × 1.5; 9, cross section of fruit, × 0.75; *10*, fruit. × 0.5.

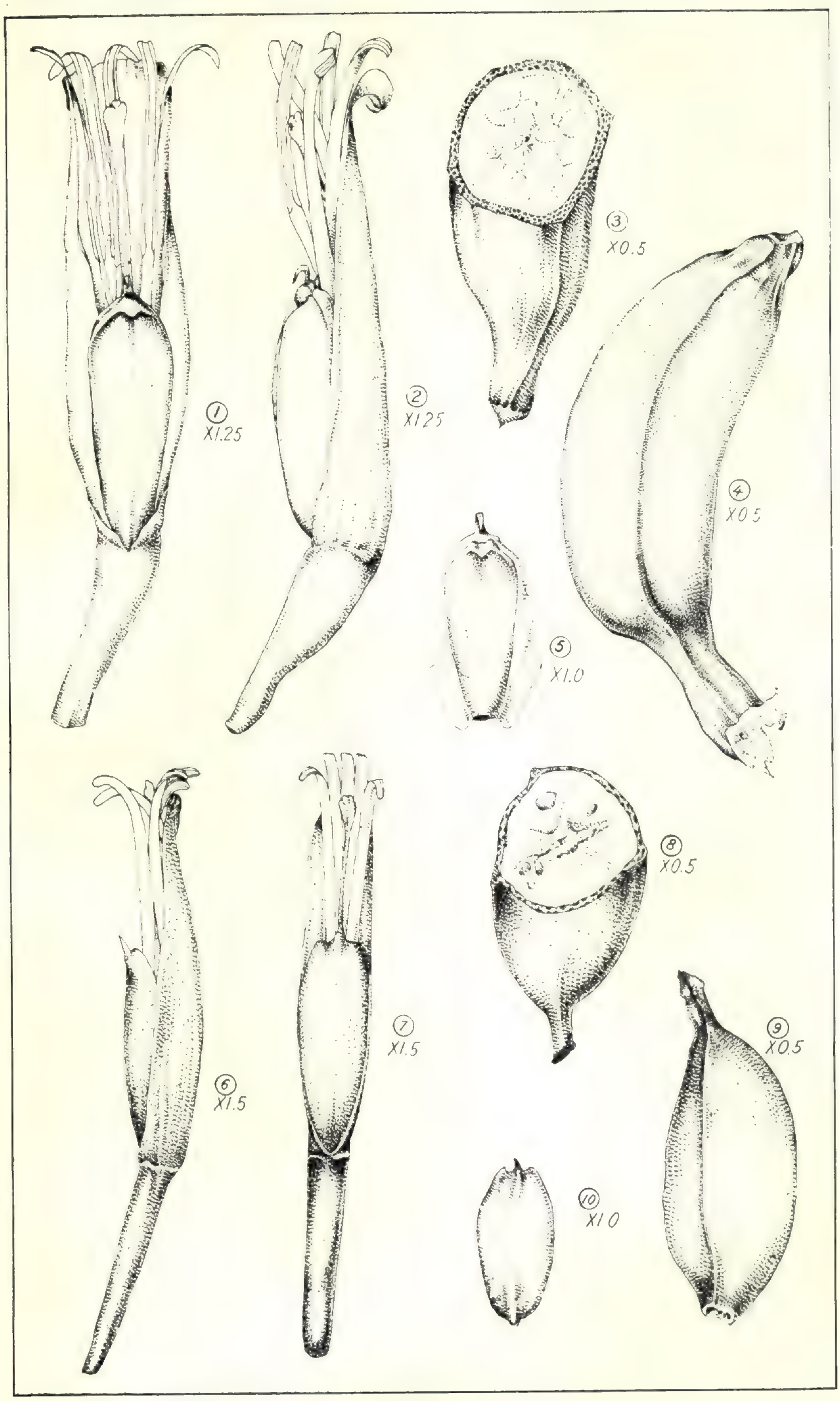
PLATE XVII

FIGS. 1 to 5. *Musa paradisiaca compressa* Blanco. Saba.
1, flower, front view, × 1.5; *2*, scale, × 1.0; *3*, flower, side view, × 1.5; *4*, fruit, × 0.5; *5*, cross section of fruit, × 0.5.
6 to 8. *Musa errans* Blanco. Saguing machin.
6, flower, front view, × 2.25; *7*, scale, × 2.25; *8*, flower, side view, × 2.25.

PLATE XVIII

FIGS. 1 to 5. *Musa humilis* Perr. Pitogo.
1, fruit, × 1.0; *2*, flower, front view, × 1.5; *3*, scale, × 1.0; *4*, flower, side view, × 1.5; *5*, cross section of fruit, × 1.0.
6 to 10. *Musa textilis* Née. Abacá.
6, flower, front view, × 2.0; *7*, scale, × 1.0; *8*, fruit, × 0.5; *9*, cross section of fruit, × 1.0; *10*, flower, side view, ×, 2.0.

[Vol. X, Sec. C, No. 5, including pages 287 to 350, was issued September 18, 1915.]



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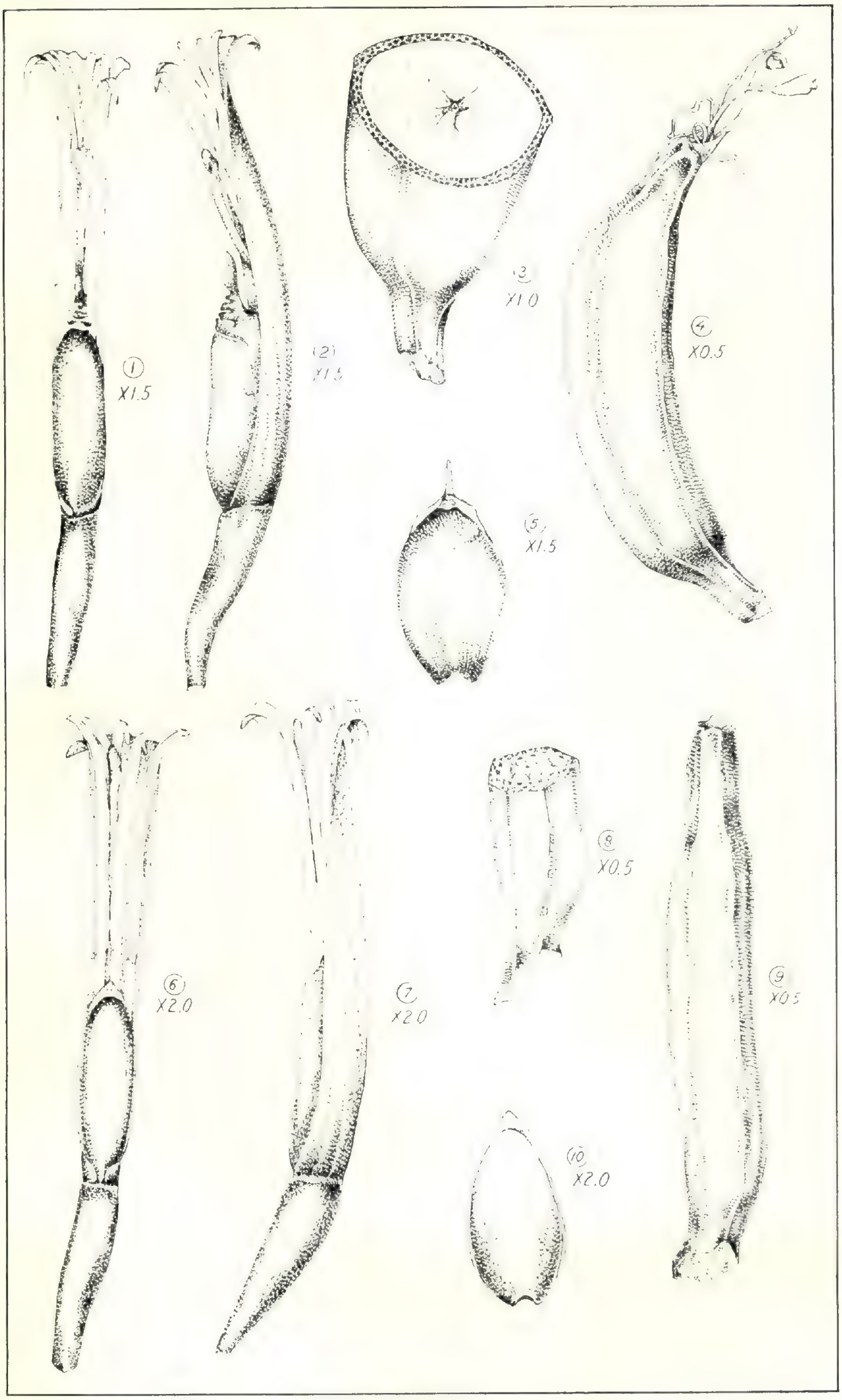
6–10. Musa errans (Blanco) var. botoan var. nov. Butuhan.



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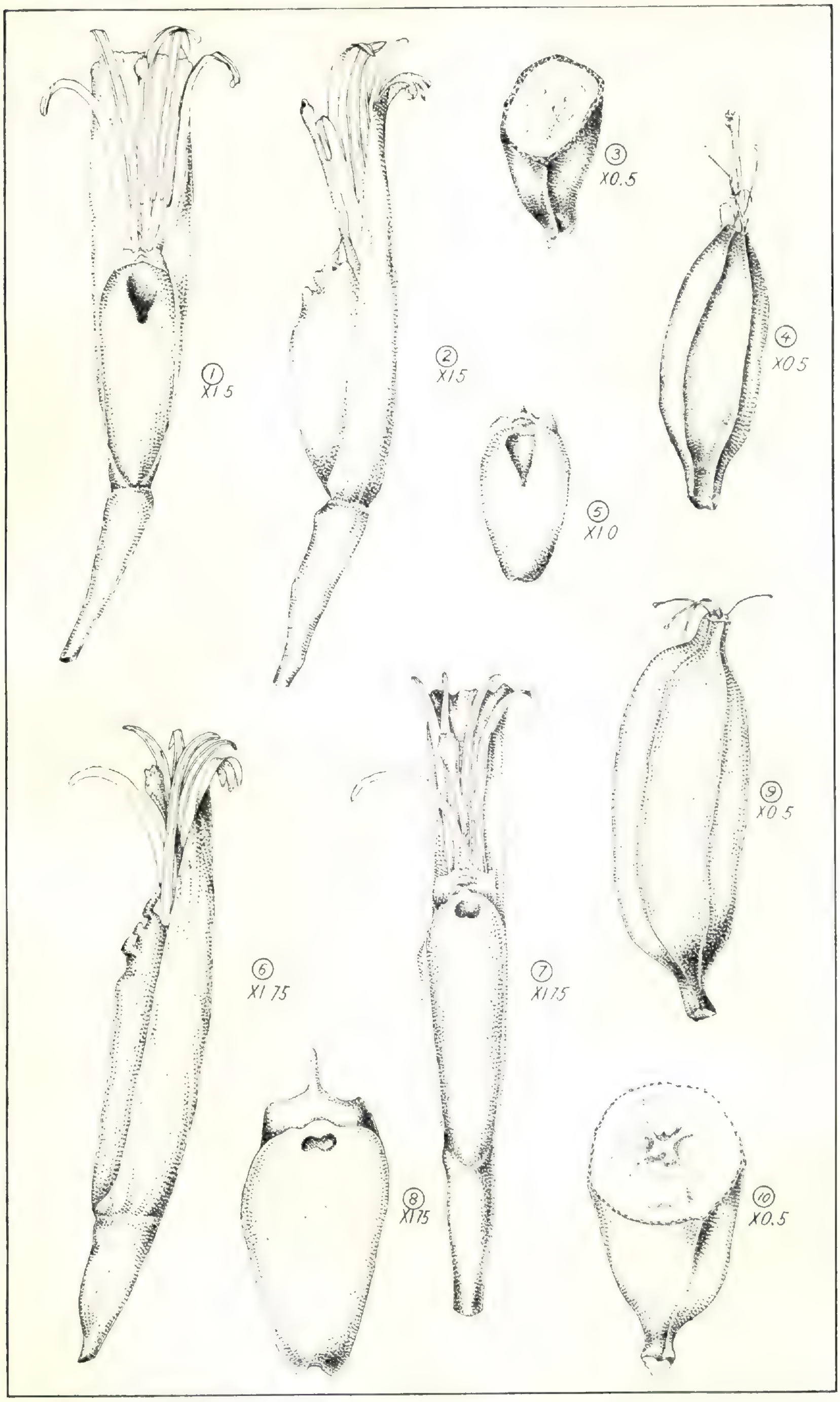
6–10. Musa sapientum L. var. tudlong var. nov. Tudlong dato.



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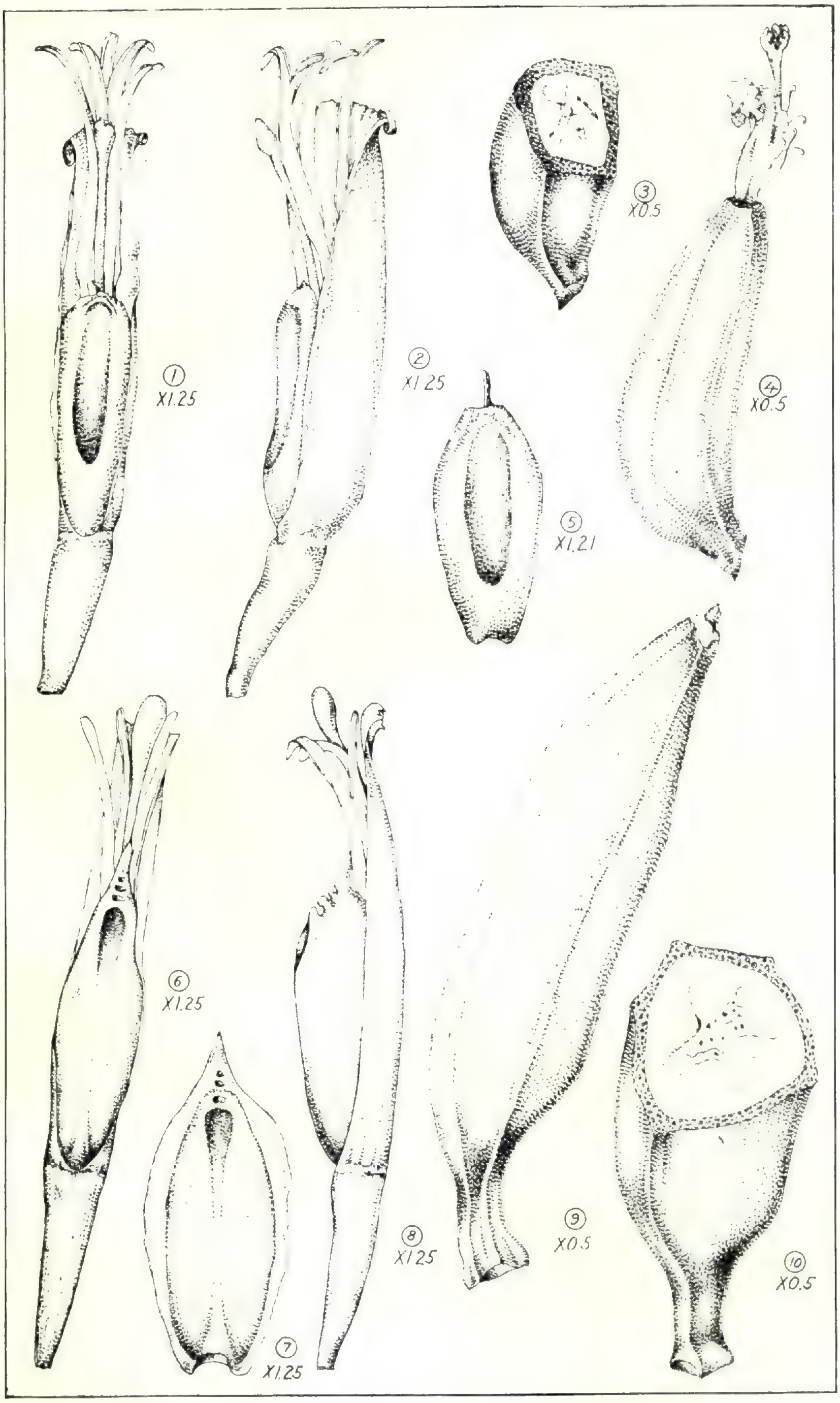
6–10. Musa sapientum L. var. glauca Blanco. Veinte cohol.



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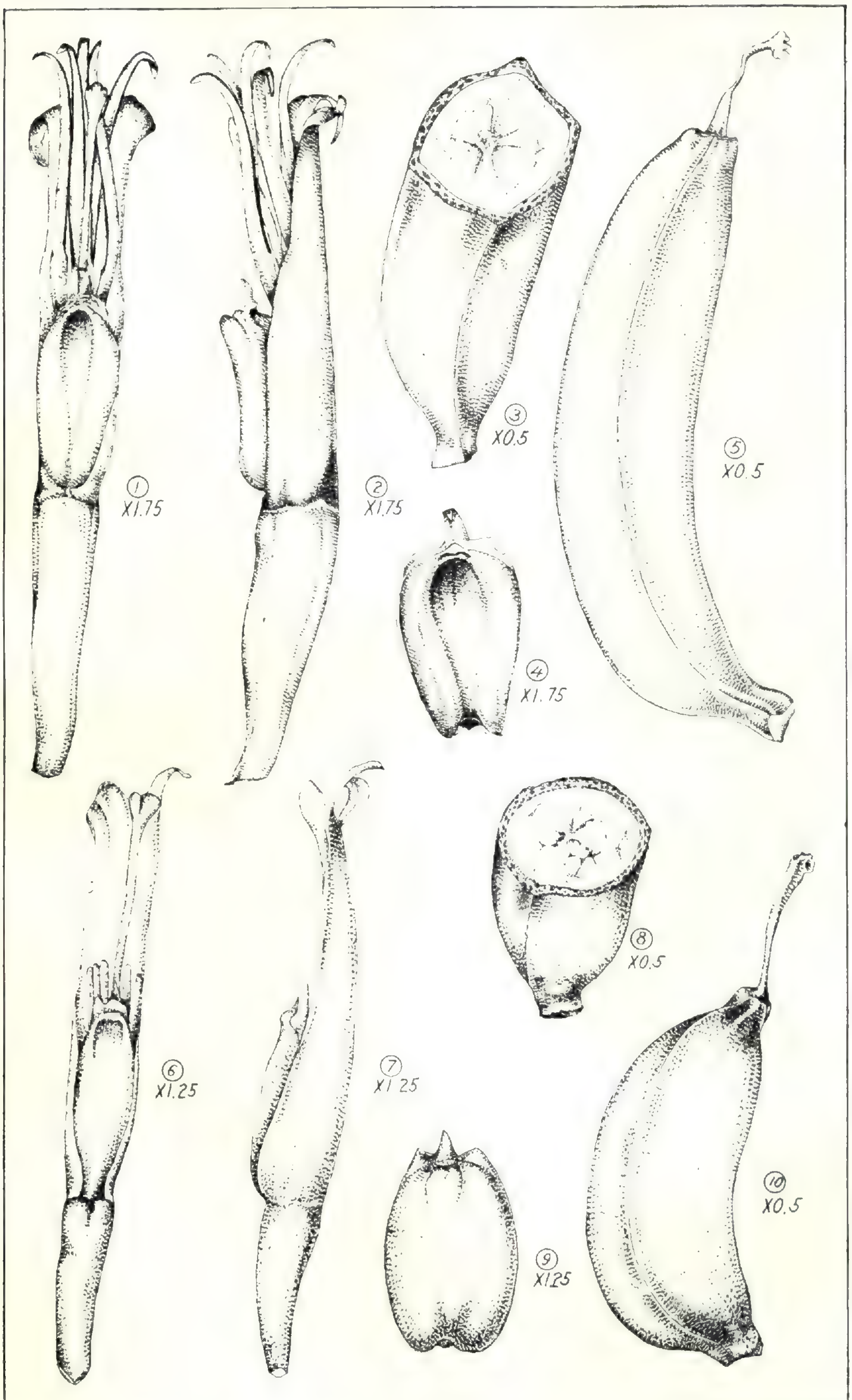
6–10. Musa sapientum L. var. garangao var. nov. Garangao.



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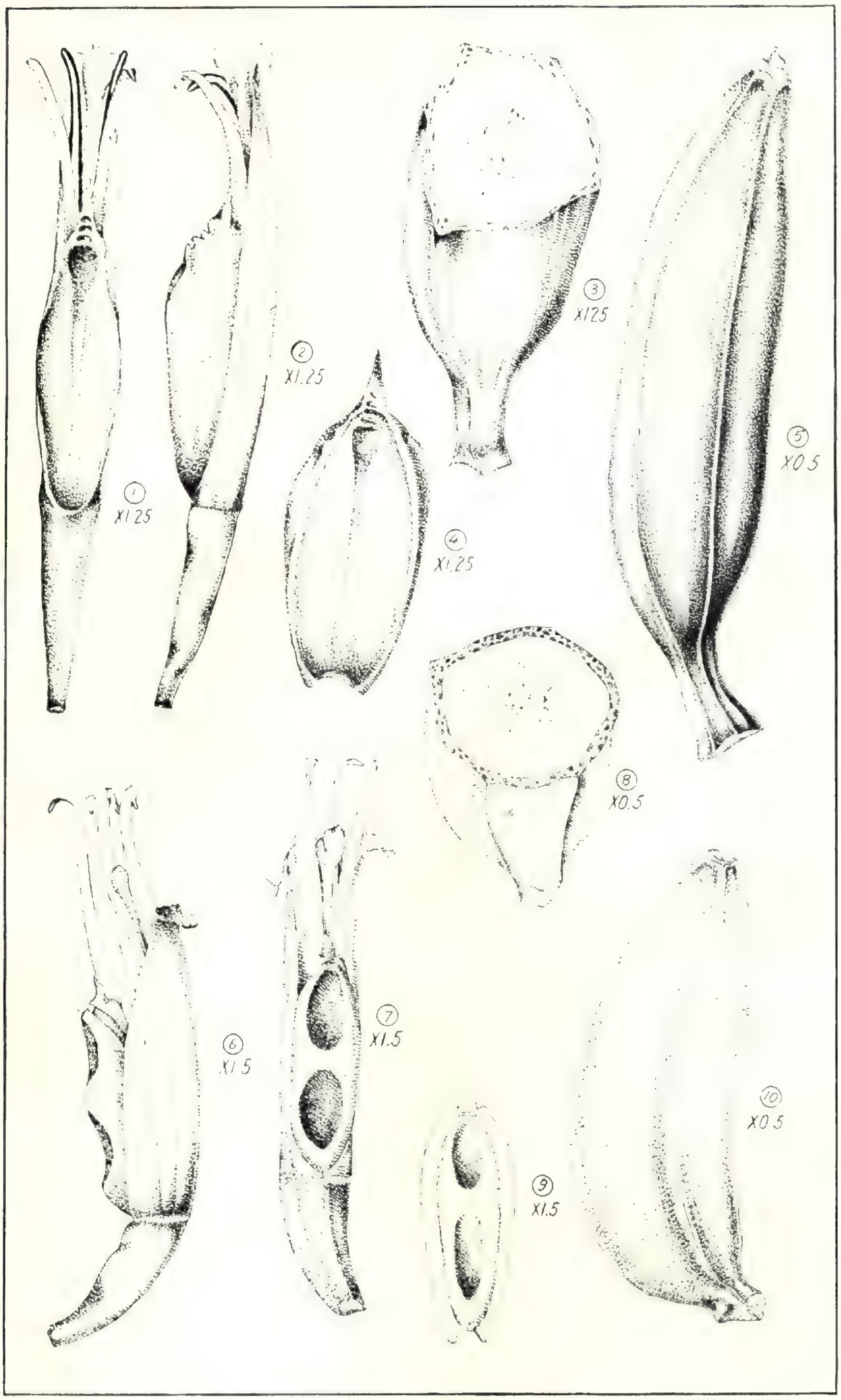

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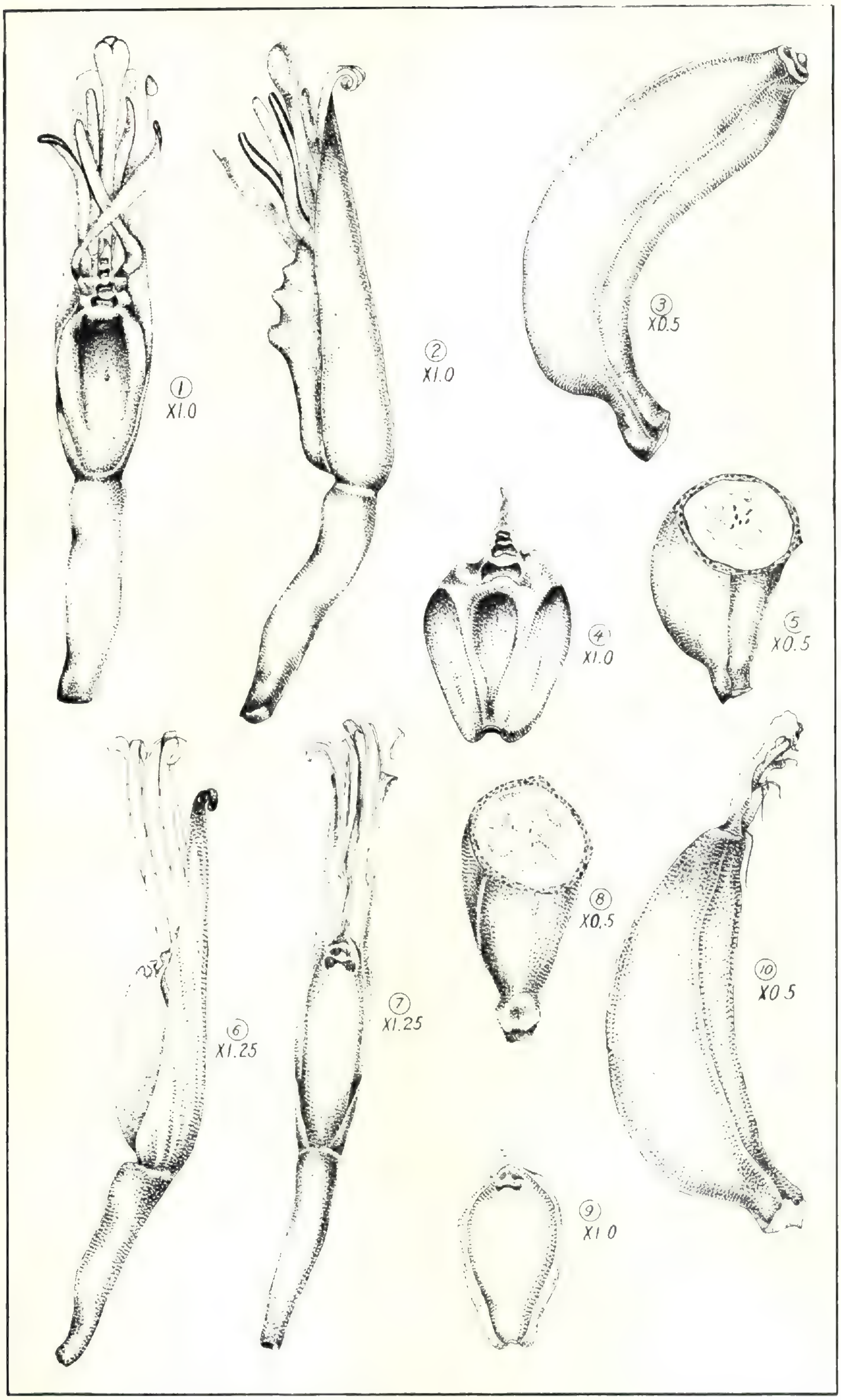
6–10. Musa sapientum L. var. canara var. nov. Canara.



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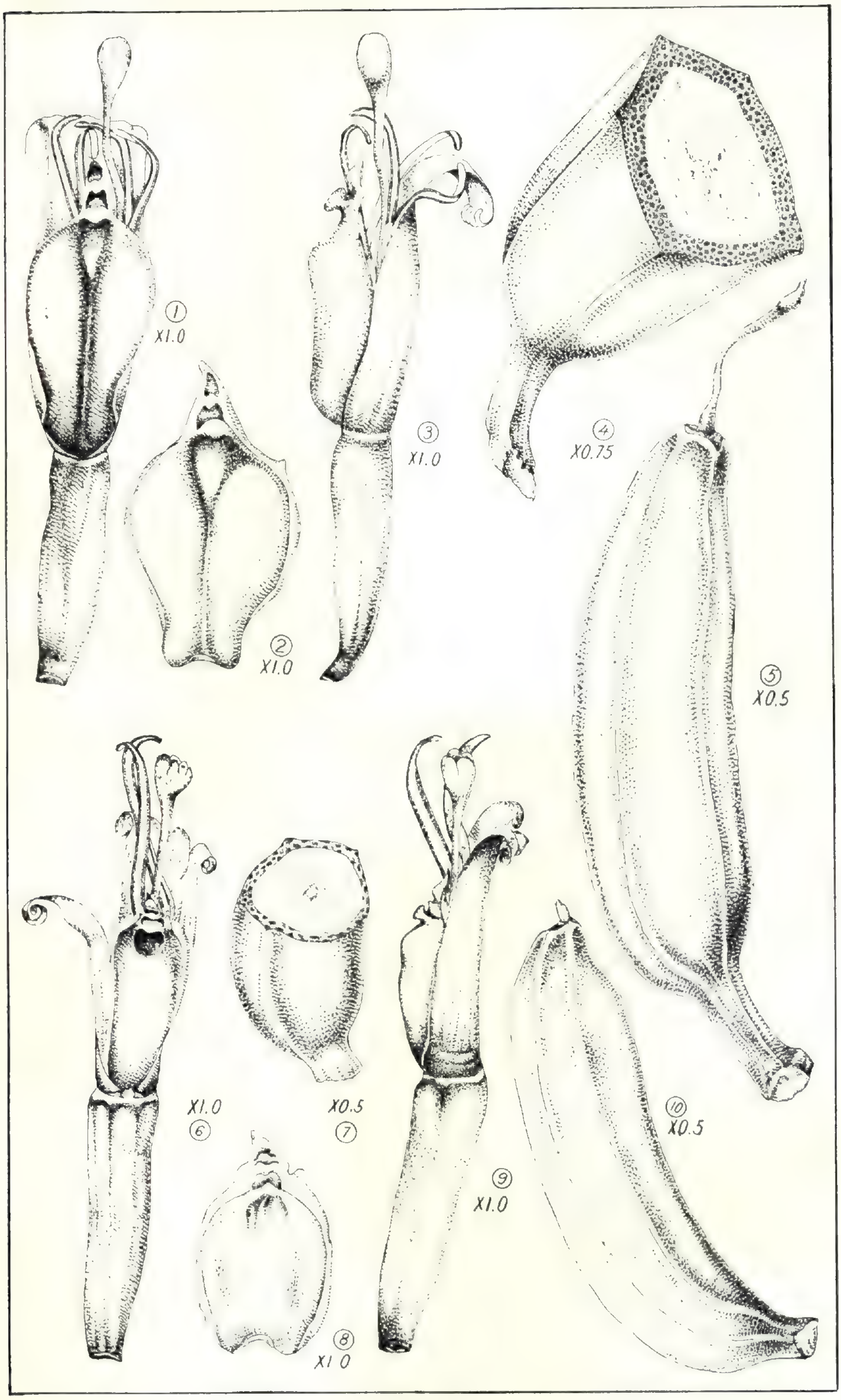

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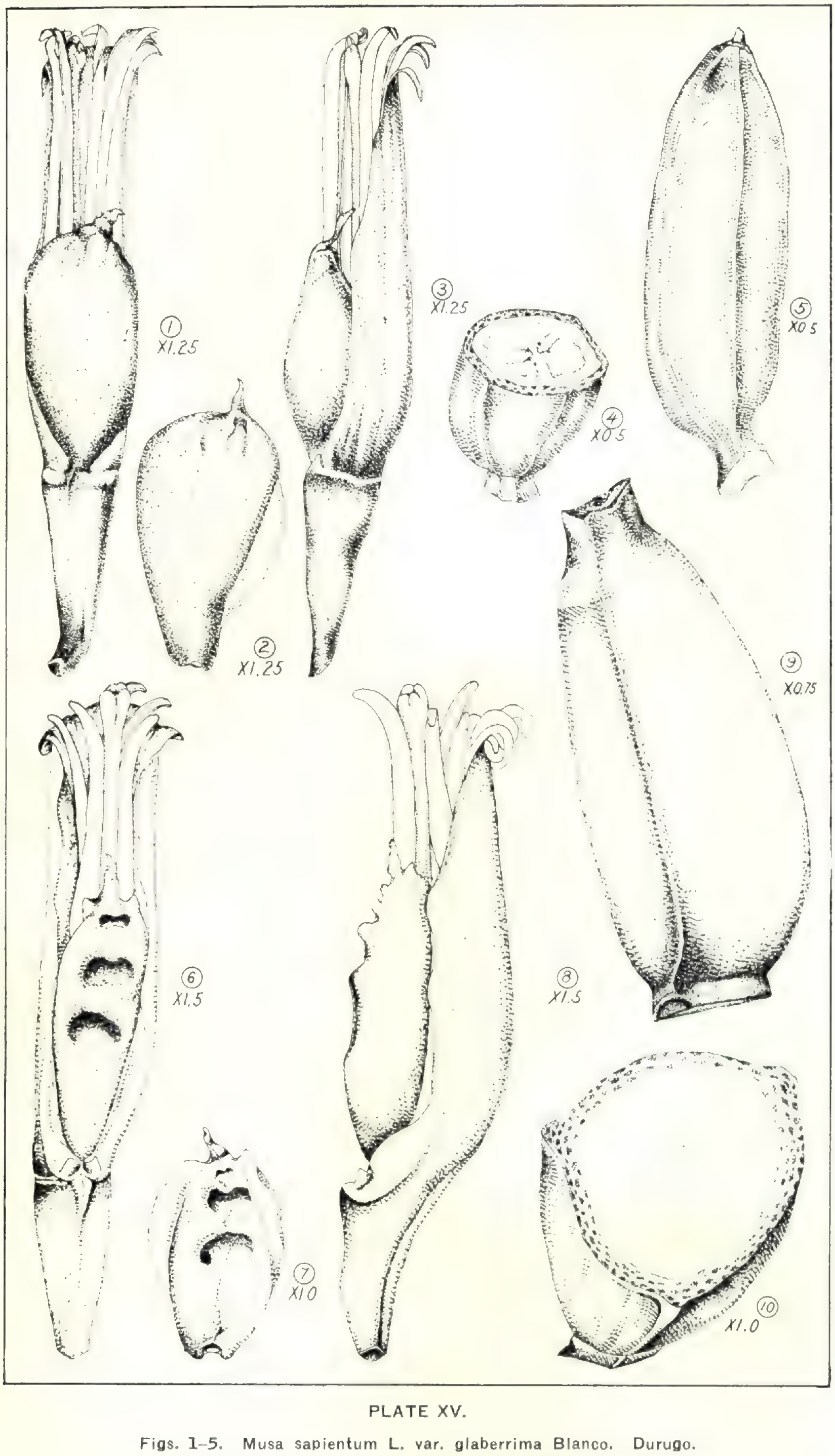

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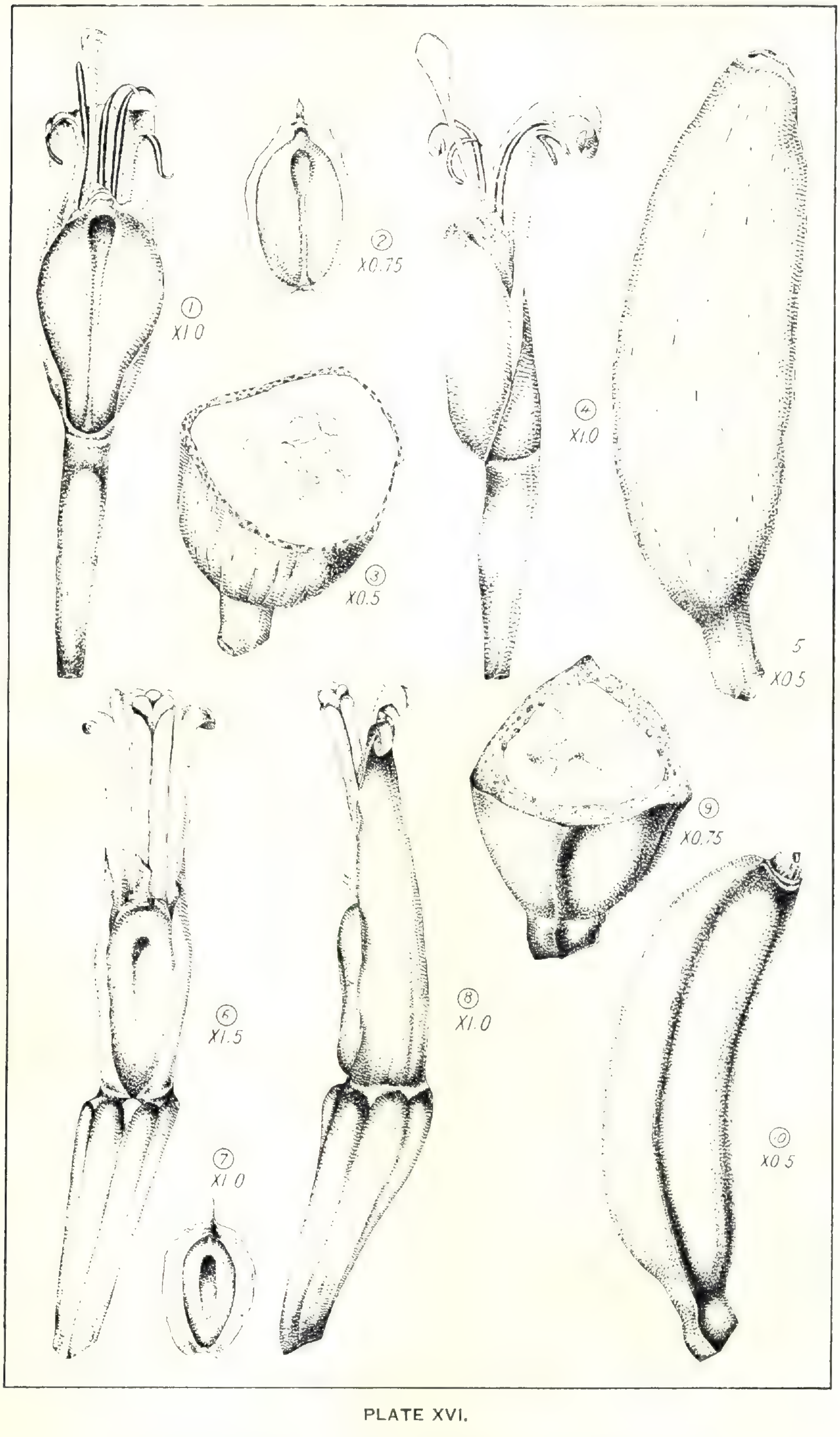

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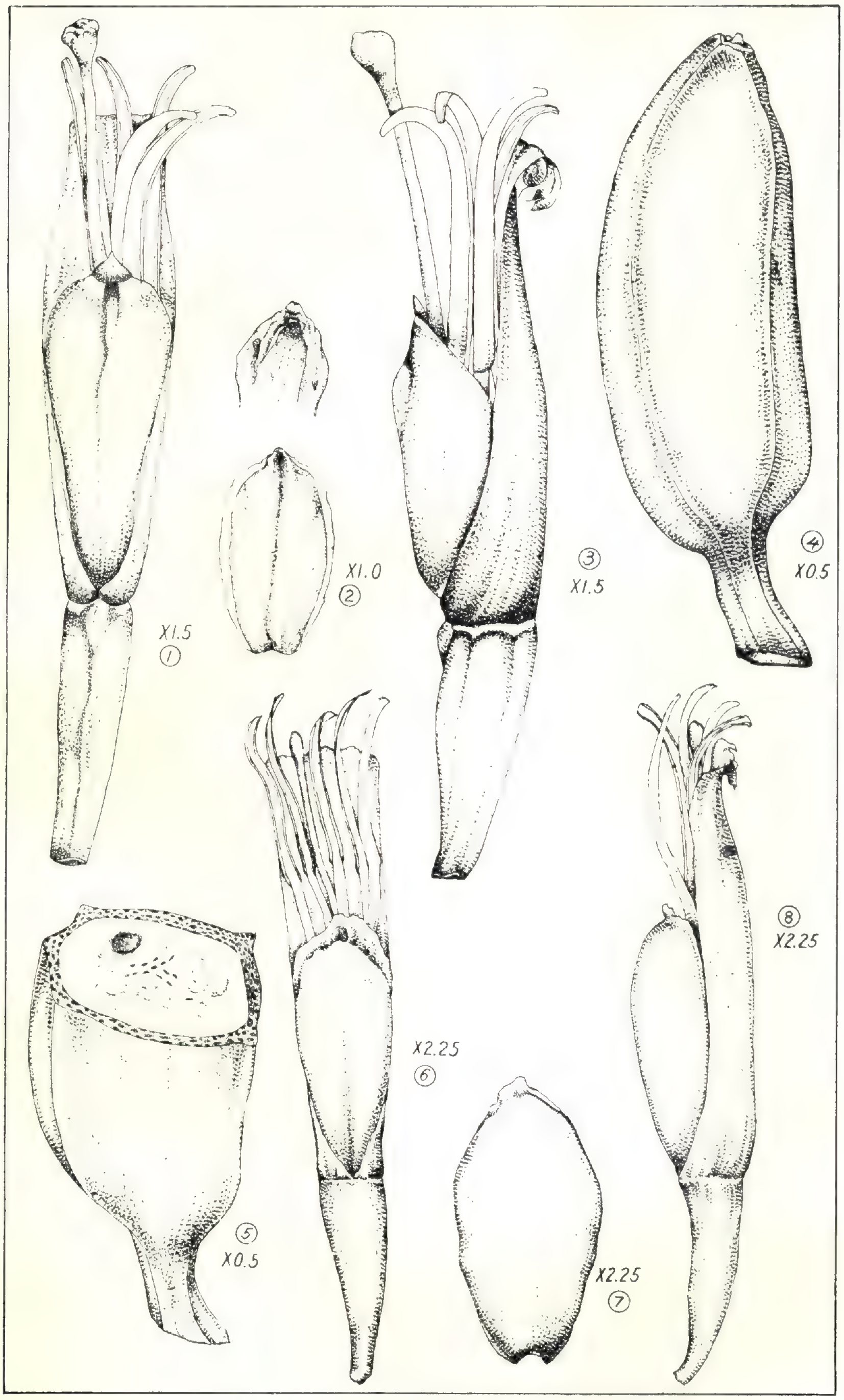

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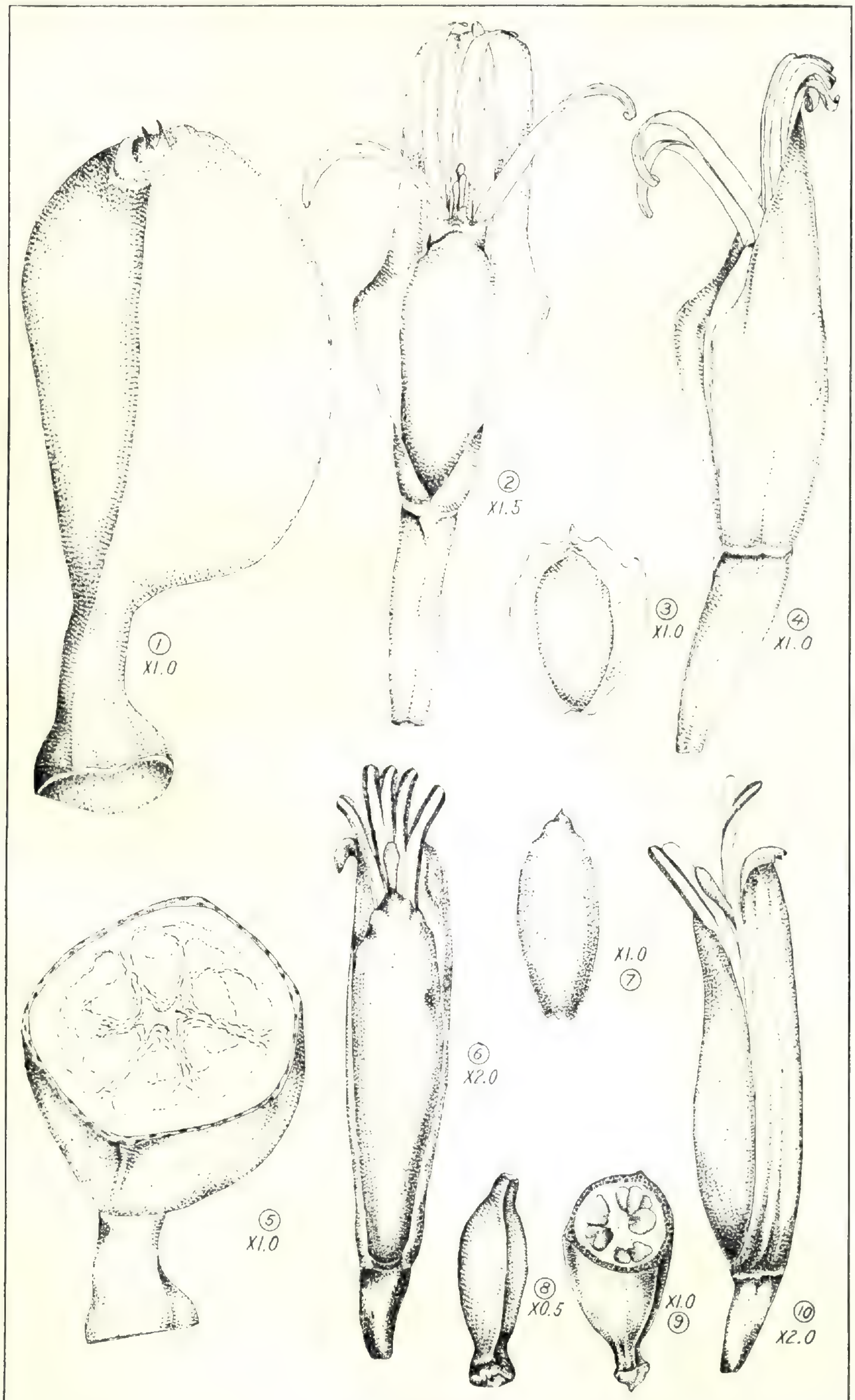

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